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Additions to the Hygrophoraceae (Fungi, Agaricales) of south-eastern Australia

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Abstract

Keys to sixty nine taxa of the Australian Hygrophoraceae are provided. Four new species are described: *Hygrocybe bolensis*, *H. helicoides*, *H. hypospoda* and *H. xanthopoda*. The first records of *Hygrocybe persistens* var. *konradii* (R. Haller Aar) Boertm. and *Hygrocybe conica* var. *conicooides* (P.D.Orton) Boertm. for Australia are supplied. Descriptions are also provided for another two taxa for which insufficient material is held to permit formal publication. The species *Hygrocybe woodii* A.M.Young is transferred to sub-genus *Humidicutis* Singer. Full descriptions and drawings are provided for the new taxa.

Introduction

Fifty seven taxa within family Hygrophoraceae were described for Australia in Young & Wood (1997). Apart from a single collection of *Camarophyllopsis darwinensis* A.M.Young from the Northern Territory and several collections of *Hygrocybe rodwayi* (Masse) A.M.Young and *Hygrocybe lewellinae* (Kalchbr.) A.M.Young from Tasmania, the remainder of the collections cited in the paper were mostly from New South Wales with smaller numbers from south-eastern Queensland and Victoria. Young & Wood *loc. cit.* acknowledged that considerable work remained to be completed on the Australian species in the areas of species ecology and distribution as well as the formal description of previously unknown taxa.

During the period April through June 1998, further collecting of Hygrophoraceae was undertaken in Tasmania, Victoria and New South Wales. The resulting collections show that Tasmania and the Australian mainland have many species in common, however there are also species which may be indigenous to Tasmania as well as several undescribed Tasmanian taxa. These Tasmanian collections will be the subject of a later paper and will not be further considered here except where reference to them is essential for development of concepts relevant to the taxa of New South Wales and Victoria.

As well as providing several new taxa, the collections from Victoria and New South Wales have considerably increased our knowledge of the Australian species of Hygrophoraceae. As a result, basidiome descriptions for several species, previously only known from the holotype collection, have been improved; the known range of taxa previously considered localised has been extended; and colour photographs are now available for previously un-photographed taxa. This photographic material will form part of the LucID keys to the Hygrophoraceae currently in preparation for the Australian Biological Resources Study.

Materials and Methods

Collections of Hygrophoraceae from the locations listed below were examined. The material from the Lane Cove Bushland Park is already the subject of a separate paper (Young 1999) and is not referred to here except to support taxonomic revision specific to this paper. The unusually large numbers of taxa within the Hygrocybeae found within a small area of the Park has led to a submission that it be considered for inclusion on the

National Heritage Register. The Park is already gazetted as an endangered habitat on the basis of its species diversity within the Hygrophoraceae.

Victoria: Wilsons Promontory ('Lillypilly Gully' and 'Chinaman's Creek' areas);

New South Wales: Blue Mountains National Park (Hazelbrook locality); Mt. Wilson Reserve (Blue Mountains area); Royal National Park (Bola Creek); Lane Cove Bushland Park.

Only collections made during 1998 or previously unexamined collections from the National Herbarium of Victoria (MEL) are cited. The descriptions are restricted to those taxa that are either new or amended. Descriptions for the remainder can be found in either Young & Wood (1997) or Young (1999).

Fresh material was described as soon as possible after collection with basidiome colours referred to Kornerup and Wanscher (1981). Material was preserved by air drying. Holotypes are deposited at either the Orange Agricultural Institute Herbarium, Orange, New South Wales (DAR) or MEL. Other material has been lodged with MEL and the Queensland Herbarium (BRI). The *hb. young.* number, which is also the collection number, is cited for reference purposes only because the collection is held at the respective state Herbarium. Microscopic examination was completed following Young (1999).

Illustrations are provided for the new taxa and for those species which are either not illustrated in previous papers (Young & Wood 1997; Young 1999) or which require additional diagrams as a result of new information. The habit-sketch and transverse section show basidiome dimensions and attachment of lamellae. The microstructures of the pileus, hymenophoral trama and stipe are generally not depicted because they usually conform to standard forms (Young & Wood 1997). For each illustrated specimen, 20 spores and 10 basidia were selected at random, drawn and measured. Cystidia were drawn if present.

The derived parameter 'Q' is defined as the quotient of the length divided by the width of the relevant spore or basidium; the mean 'Q' is the quotient of the mean length and width respectively. The values of the spore mean length and width for most collections will not vary more than $\pm 0.5 \mu\text{m}$ from the values given here while the values of the spore mean Q for most collections are within ± 0.3 from that given here. The values for basidial length and width means and mean Q's should be applied similarly. The derived parameter 'R' (Young & Wood 1997) is not applied as it is not considered to have taxonomic value (Young 1999).

This paper lists several species of Hygrophoraceae originally collected and described from Europe that are stated to have no type (Boertmann *pers. com.*). European mycologists are continuing to address this situation by the nomination of lectotypes. It is firmly believed that such nominations are best made by mycologists both familiar with the European flora and with material obtained from locations as close as possible to the original collection sites. For these reasons, no proposal of lectotypes is made here. Where types do not exist, the species concepts of Boertmann (1995) are used.

General Comments

These studies confirm the unusual richness of the Australian flora within family Hygrophoraceae and in particular for tribe Hygrocybeae. No additional taxa for tribe Hygrophoreae (genus *Hygrophorus* Fr.) have been found although the single species known, *Hygrophorus involutus* G. Stev., is widespread and common.

Several taxa occurring in Australia (e.g. *Hygrocybe persistens* (Britzelm.) Singer and *H. conica* (Schaeff. : Fr.) P.Kumm.) are considered likely to be introduced species, possibly from Europe. This is suggested by their occurrence at major ports of entry and apparently in association with introduced grasses, but this does not explain other occurrences of species first described from Europe such as *H. chlorophana* (Fr. : Fr.) Wünsche from the Snowy Mountains of New South Wales, which is in a far more isolated location. The collections made during 1998 also confirm that most taxa believed

indigenous to Australia are collected from forest or woodland. This contrasts sharply with the European species of Hygrophoraceae, many of which form part of a very distinctive grassland flora. *Hygrocybe persistens* and *H. conica* both occur in grassland habitats in Europe and Australia.

Very large areas of Australia remain to be investigated. Collections of Hygrophoraceae from the coastal ranges of central Queensland and photographic records from the Darwin area of the Northern Territory suggest that a very rich tropical flora occurs. More species will undoubtedly be found in the regions that have been examined during this study and the Western Australian species have never been fully investigated. Young & Wood (1997) estimated that there existed 150–200 Australian species of family Hygrophoraceae; this estimation is still considered valid.

Taxonomy

Family **Hygrophoraceae** Lotsy *Vortr. Bot. Stammesg.* 1: 706 (1907). *Genus typica*: *Hygrophorus* Fr.

Basidiome small to medium sized, stipitate. *Pileus* conical, convex, umbilicate or infundibuliform; sometimes perforate; surface dry, moist, viscid or glutinous, smooth to squamulose or fibrillose. *Lamellae* generally thick, waxy, and distant; free or adnexed to decurrent. *Stipe* central, often brittle, with similar surface moisture or structures to pileus. Universal veil generally absent. Context soft, frequently thin, waxy and translucent. Spore print white, cream, pale violaceous or magenta.

Spores small to large, subglobose to ovoid, ellipsoid or cylindrical, sometimes constricted, smooth, rarely nodulose or echinulate, hyaline or rarely with dark contents, inamyloid rarely amyloid. *Basidia* often long and narrow. *Cheilocystidia* sometimes present, pleurocystidia rare. *Hymenophoral trama* regular, irregular or bilateral. *Pileipellis* a cutis or trichoderm (sometimes gelatinised or glutinous) or rarely a hymeniderm. Development gymnocarpic, occasionally hemiangiocarpic. Terrestrial, rarely lignicolous, mycorrhizal or saprophytic.

Key to the tribes of Hygrophoraceae

- 1. Lamellae with regular to irregular trama, never divergent **Tribe 1. Hygrocybeae**
- 1. Lamellae with divergent trama **Tribe 2. Hygrophoreae**

TRIBE 1. HYGROCYBEAE Kühner *Bull. Mens. Soc. Linn. Lyon* 48: 621 (1979). *Genus typica*: *Hygrocybe* (Fr.) P.Kumm.

Hymenophoral trama regular to irregular; not forming ectomycorrhizae.

Key to the genera of Hygrocybeae

- 1. Pileipellis composed of hyphae forming a cutis, ixocutis, trichoderm or ixotrichoderm of non-inflated, hyphal elements **Genus 1. *Hygrocybe***
- 1. Pileipellis an hymeniderm but sometimes approaching an epithelium and then composed of inflated elements **Genus 2. *Camarophyllopsis***

Genus 1. *Hygrocybe* (Fr.) P.Kumm., *Führ. Pilzk.*: 26 (1871); *Hygrocybe* Fr., *Syst. Mycol.* 1: 101 (1821); *Camarophyllus* Fr., *Syst. Mycol.* 1: 98 (1821); *Camarophyllus* (Fr.) P.Kumm., *Führ. Pilzk.*: 2 (1871). *Species typica*: *Agaricus conicus* Schaeff., *Fungi Bavar. Palat. nasc.* 4: 2 (1774).

Basidiome fleshy, often watery or waxy in texture, collybioid, mycenoid or omphaloid, generally small to medium sized but occasionally large; variously coloured, often bright red, orange, yellow, green and lilac or combinations of these colours. *Pileus* opaque or hygrophanous, striate or not, dry to glutinous, smooth to squamulose or fibrillose. *Lamellae* usually sub-distant to distant, free to adnate or decurrent, thick to very thick and with waxy appearance when fresh; velar structures absent. *Stipe* dry to glutinous, smooth to squamulose or fibrillose; spore print white, cream coloured, pale magenta or pale lilac.

Spores hyaline, smooth or rarely spinose, non-amyloid (for known Australian taxa). *Basidia* sometimes long (25–70 µm), Q: 2.5–10.0, 2- and 4-spored forms frequent. *Cheilocystidia* present in some species either as true or pseudo-cystidia; *pleurocystidia* rare and then as pseudo-pleurocystidia. *Hymenophoral trama* regular, subregular to irregular, tramal elements from very long (>1000 µm) to very short (<30 µm); clamp connections usually present. *Pileipellis* a cutis, ixocutis, trichoderm or ixotrichoderm. Development gymnocarpic and stipitocarpic.

Habitat and Distribution: Solitary to gregarious, terrestrial, rarely on wood and then only if the wood is extremely rotten; substrates include soil, humus, moss; grasslands to forest and saprophytic. Cosmopolitan from subarctic or subantarctic to tropics and alpine regions.

Key to the subgenera of *Hygrocybe*

1. Hymenophoral trama irregular, composed of short (20–150 µm) interwoven hyphal elements; basidiome colours often subdued (white, brown, dull lilac-grey) but may be orange, apricot or bright lilac; lamellae arcuate to decurrent; clamps present, occasionally rare in the hymenophoral trama.....**subgen. 1. *Cuphophyllus* Key 1.**
1. Hymenophoral trama regular to subregular (if subregular, then basidiome brightly coloured) and composed of parallel hyphal elements which are either 'long tubular' or chains of short elements; basidiome often very brightly coloured (red, orange, yellow, green, lilac); lamellae variously attached; clamps present, at least at the bases of the basidia..... 2
- 2(1). Hymenophoral trama very regular, composed of very long (1000–3000 µm), aseptate, tubular elements with tapered ends; lamellae free, ascending or narrowly adnate; tissues may blacken on bruising; basidia usually short (mean length 30–40 (–45) µm); except for the aseptate hymenophoral trama, clamps usually present throughout the basidiome, rarely absent in some taxa with 2-spored basidia**subgen. 2. *Hygrocybe* Key 2.**
2. Hymenophoral trama regular to subregular, composed of parallel chains of short, sometimes inflated hyphal elements (usually 20–400 µm); lamellae adnate to decurrent; tissues never blackening on bruising; basidia sometimes long (40–60 µm); clamps either present throughout the basidiome or present only at the bases of the basidia..... 3
- 3(2). Clamps present throughout the basidiome and of medallion form or not; pileus never splitting radially so that the split occurs along the medial section of a lamella**subgen. 3. *Pseudohygrocybe* Key 3.**
3. Clamps absent throughout the basidiome except at the bases of the basidia and then frequently of medallion form; pilei tending to split radially along the medial line of at least some lamellae so that the half lamellae remain joined at the lamellae margins and also attached to the pileus at the edges of the radial split.....**subgen. 4 *Humidicentis* Key 4.**

Key 1: Species of subgenus *Cuphophyllus*

1. Pileus pure white to off-white and pellucid striate; or cream coloured and then sometimes with biscuit brown tints at the depressed centre, not pellucid striate2

1. Pileus lilac, yellow, orange, orange brown or dull dark brown to grey brown; pellucid striate or not3
- 2(1). Spores subglobose to globose ($5-7 \times 4.5-6 \mu\text{m}$); pileus cream coloured and usually with brownish tints at the centre; not hygrophanous and not pellucid striate**3. H. rodwayi**
2. Spores ellipsoid ($7-11 \times 4.5 \mu\text{m}$); white to off-white; hygrophanous and pellucid striate for at least half the pileus diameter**4. H. virginea**
- 3(1). Pileus lilac or pinkish lilac4
3. Pileus yellow, orange, orange brown or a shade of dark brown or grey brown5
- 4(3). Pileus a shade of pure lilac to lilac grey, hygrophanous, surface smooth; pileus margin not inrolled when young; stipe-base lilac**2. H. reesiae**
4. Pileus bright pinkish lilac, not hygrophanous, surface finely velvety under $\times 10$ lens; pileus-margin inrolled when young; stipe base yellow**H. cheelii**
- 5(3). Spores mostly (>90%) ellipsoid; lamellae white to off white**H. unispora**
5. Spores mostly (>90%) subglobose to globose; lamellae variously coloured6
- 6(5). Pileus, lamellae and stipe in various shades of yellow-orange to orange or orange-brown7
6. Pileus grey brown to dull, dark brown; lamellae cream to greyish or violaceous grey; stipe creamish grey; shades of yellow-orange, orange and orange-brown completely absent**H. watagensis**
- 7(6). Pileus apricot-yellow to light orange, always smooth; stipe 1.5-3(-3.5) mm diam.; spores ($3.5-4-6.5 \times 3.5-4.5(-5) \mu\text{m}$, mean $5 \times 4 \mu\text{m}$)**1. H. aurantiopallens**
7. Pileus orange to orange-brown, with white furfuraceous layer when young; stipe 4-7 mm diam.; spores $6-8.5 \times 5-7.5 \mu\text{m}$, mean $7.5 \times 6.3 \mu\text{m}$..**H. austropratensis**

Key 2: Species of Subgenus *Hygrocybe*

1. Basidiomes wholly or at least in some part(s) becoming black when bruised; pilei always at first acutely conical, often splitting radially2
1. Basidiomes never bruising black in any part; pilei convex or conical; splitting radially or not3
- 2(1). Pileus and stipe covered with loose, black fibrils; spores subglobose to globose (rarely ellipsoid) and usually some with brown contents; cheilocystidia present and fasciculate; clear or yellow tinted latex often exuding from cut tissues**5. H. astatogala**
2. Pileus and stipe not covered with loose, black fibrils; spores ellipsoid to cylindrical and never with brown contents; cheilocystidia absent; latex never present**8. H. conica**
- 3(1). Stipe either wholly yellow or yellow with at most with a few, scattered reddish tints4
3. Stipe either wholly red or red with extreme base yellow or white8
- 4(3). Pileus mostly or wholly red, sometimes yellowish at the margins5
4. Pileus mostly or wholly yellow, sometimes with reddish or orange tints at the centre6
- 5(4). Cheilocystidia present; pileus dry or very slightly viscid in very humid conditions**H. cystidiorubra**
5. Cheilocystidia absent; pileus glutinous**H. rubrolutea**

- 6(4). Pileus acutely conical becoming umbonate; spores broadly ellipsoid to subglobose or globose and without medial constriction7
6. Pileus convex; spores oblong to ellipsoid and some with medial constriction
.....7. **H. chlorophana**
- 7(6). Basidia 2-spored; spores very broadly ellipsoid to globose, mean $11.5 \times 8.5 \mu\text{m}$; lamellae at first yellow then becoming orange or some basidiomes with orange lamellae9. **H. persistens**
7. Basidia 4-spored; spores broadly ellipsoid but never subglobose or globose, mean $9.8 \times 6.8 \mu\text{m}$; lamellae always yellow**H. austrolutea**
- 8(3). Stipe dry; lamellae always adnate9
8. Stipe distinctly viscid to glutinous; lamellae adnexed to adnate10
- 9(8). Lamellae rosy or reddish with yellow margins; pileus convex**H. kandora**
9. Lamellae yellow with at most pink tints, margins concolorous; pileus acutely conical to umbonate**10. H. siccatopapillata**
- 10(8). Pileipellis an ixocutis; lamellae cherry-red to orange-yellow
.....**6. H. cerasinomutata**
10. Pileipellis an ixotrichoderm; lamellae light cream buff**H. wilsonensis**

Key 3: Species of subgenus *Pseudohygrocybe*

1. Both pileus and stipe distinctly viscid to glutinous (some taxa only display this field character fully in the immature stages); pileipellis and stiptipellis either an ixocutis or an ixotrichoderm2
1. Pileus dry, viscid or glutinous, stipe always dry; pileipellis may be a cutis, a trichoderm, an ixocutis or an ixotrichoderm; stiptipellis a cutis17
- 2(1). Basidiomes green to brown, sometimes with yellow tints, rarely brick-pink in old rain-washed pilei, never bright yellow, orange or red; both pileus and stipe always strongly glutinous3
2. Basidiomes bright yellow, orange, pink, red or combinations of these colours; both pileus and stipe viscid to glutinous8
- 3(2). Either or both pileus and stipe wholly green; solitary, gregarious, caespitose or in troops; if basidiomes in troops then usually some members exhibiting colour variations ranging from green to brown4
3. Both pileus and stipe wholly brown; rarely solitary and usually gregarious or caespitose; if basidiomes in troops then often with some members exhibiting colour variations ranging from green to brown7
- 4(3). Margins of lamellae fertile and without cheilocystidia; both pileus and stipe remaining deep green other than fading due to age**24. H. stevensoniae**
4. Margins of lamellae crowded with hyphal shaped cheilocystidia, occasionally with scattered basidia; pileus and stipe green but may exhibit colour changes to brown during maturity5
- 5(4). Lamellae lime-green; spore mean $\pm 10 \times 6 \mu\text{m}$; dried material dull green
.....**22. H. pseudograminicolor**
5. Lamellae white, or with green tints; spore mean $\pm 6.5 \times 4 \mu\text{m}$; dried material brick-pink6
- 6(5). Cheilocystidia embedded in a gluten thread; both pileus and stipe wholly green or displaying intermediate coloration from pure green to pure brown and then usually in troops**16. H. graminicolor**
6. Cheilocystidia without a gluten thread; basidiomes light dull green
.....**H. vallomarginata**

- 7.(3) Cheilocystidia present and embedded in a gluten thread; pileus convex to umbilicate; basidiomes usually within troops exhibiting colour variations from brown to green **16. H. graminicolor**
7. Cheilocystidia and gluten thread absent; pileus conical to umbonate; solitary, gregarious or caespitose but never with green tints **H. bubalinoviscida**
- 8(2). Both pileus and stipe bright chrome or lemon-yellow 9
8. Pileus and stipe variously coloured, either may be yellow but not both 10
- 9(8). Pileus convex, usually also umbilicate; lamellae decurrent; cheilocystidia present and embedded in a gluten thread **12. H. chromolimonea**
9. Pileus conical or campanulate; lamellae adnate with a decurrent tooth at most; cheilocystidia and gluten thread absent **H. chromoxantha**
- 10(8). Pileus red or orange-red 12
10. Pileus pink or cream coloured to orange-brown 11
- 11(10). Lamellae adnate, pinkish orange; stipe multicoloured, lavender grey apically then pink and finally yellow at the base; spinose spores absent **H. iropus**
11. Lamellae deeply decurrent, white to cream coloured; stipe yellow-orange to bright red; spinose spores present **H. anomala**
- 12(10). Lamellae adnate or adnate with at most a decurrent tooth 13
12. Lamellae strongly decurrent 16
- 13(12). Lamellae bright orange-yellow; stipe yellow; pileipellis an ixotrichoderm
..... **H. minutula**
13. Lamellae white, cream coloured or yellowish; stipe red to orange yellow; pileipellis an ixocutis 14
- 14(13). Spore mean $\pm 5.8 \times 3 \mu\text{m}$; lamellae white to pale cream coloured
..... **H. subminutula**
14. Spore mean $\pm 8.1 \times 4.8 \mu\text{m}$; lamellae cream with pink tints or yellow 15
- 15(14). Fasciculate hyphal cheilocystidia present **33. H. sp. Otw1**
15. Cheilocystidia absent **25. H. sylvaria**
- 16(12). Lamellae yellow with pinkish tints; spores broadly elliptical, not constricted, mean $\pm 10 \times 7 \mu\text{m}$ **17. H. hayi**
16. Lamellae white, cream coloured with age; spores elliptical to subcylindrical and the latter spores often constricted; spore mean $\pm 6.9 \times 4.2 \mu\text{m}$ **H. lanecovenssis**
- 17(1). Basidia and spores dimorphic 18
17. Basidia and spores monomorphic 19
- 18(17). Pileus red; lamellae rosy red and deeply decurrent **14. H. firma**
18. Pileus ochre-green; lamellae orange and adnate **H. taekeri**
- 19(17). Pileus dry; at once with a trichoderm at least at the centre and bright red, orange or yellow 20
19. Pileus dry or viscid; if a trichoderm then also brown 23
- 20(19). Lamellae adnate with at most a decurrent tooth 21
20. Lamellae deeply decurrent (if both pileus and stipe red with lamellae livid red and spore mean $\pm 11.2 \times 6.0 \mu\text{m}$, then see **H. flammans**) 22
- 21(20). Lamellae cream to very pale yellow; stipe lemon yellow to orange yellow
..... **H. tidbillensis**
21. Lamellae yellowish red to pinkish orange; stipe red **21. H. miniata**

- 22(20). Lamellae at first white with red margins becoming yellow with orange margins; cheilocystidia present; associated with sphagnum bogs**H. dorothyi**
22. Lamellae at first off-white becoming creamy yellow or distinctly yellow; cheilocystidia absent; associated with soil and moss in forests, woodland or (more rarely) grassland.....**H. cantharellus**
- 23(19). Pileus dry, forming a cutis or a fibrillose trichoderm; pileal colours grey to brown24
23. Pileus dry or viscid, forming a cutis or an ixocutis; pileal colours wholly or combinations of white, red, orange, yellow-green and lilac.....26
- 24(23). Pileus a smooth cutis with some short projecting hyphal endings, dark vinaceous brown; lamellae white or white with brownish tints.....**H. badioclavata**
24. Pileus fibrillose, dark brown to grey-brown; lamellae grey or dull yellow.....25
- 25(24). Lamellae grey; pseudopleurocystidia absent**15. H. fuliginosquamosa**
25. Lamellae dull yellow; large, cylindrical pseudopleurocystidia present.....**H. lawsonensis**
- 26(23). Lamellae free, sub-free, adnexed, adnate or adnate with a decurrent tooth.....33
26. Lamellae arcuate or decurrent.....27
- 27(26). Lamellae wholly pale lilac to deep violet or violet-grey; (if lamellae are rosy pink with pale lilac-pink margins see **H. sanguineocrenulata**)28
27. Lamellae without any lilac or violet colours or tints.....29
- 28.(27) Pileus convex, orange-brown with lilac margin; lamellae pale lilac; spinose spores present**H. anomala**
28. Pileus convex and umbilicate, light to deep brown or reddish brown and never with lilac margin; lamellae deep lilac to violet; spinose spores absent.....**20. H. lilacolamellata**
- 29(27). Lamellae 'livid red', pileus and stipe deep red: spore mean $\pm 11.2 \times 6 \mu\text{m}$**H. flammans**
29. Lamellae yellow to orange or orange-brown; pileus and stipe variously coloured; spore mean length less than $10 \mu\text{m}$30
- 30(29). Spores sub-globose to globose, mean $\pm 4.7 \times 3.9 \mu\text{m}$**32. H. sp. BM1**
30. Spores ellipsoid, mean length greater than $6 \mu\text{m}$ 31
- 31(30). Pileus and stipe orange brown to orange; lamellae orange grey to orange brown,**18. H. hypospoda**
31. Pileus and stipe red; lamellae yellow or pale orange32
- 32.(31) Pileus convex, dry; lamellae bright yellow; spores long ellipsoid to cylindric and very strongly constricted, spore mean $\pm 8.4 \times 4.1 \mu\text{m}$ **H. sp. LC1**
32. Pileus convex and usually umbilicate; dry or very slightly viscid when very young; lamellae yellow to pale orange; spores ellipsoid, a few slightly constricted, spore mean $\pm 7.5 \times 4.7 \mu\text{m}$**11. H. bolensis**
- 33(26). Pileus (and lamellae and stipe) white; pileus viscid to glutinous.....**9. H. leucogloea**
33. Pileus, lamellae and stipe either not white or lamellae only are white; pileus viscid or not.....34
- 34(33). Pileus conical, viscid; pileipellis a well developed ixocutis; stipe yellow or yellow with orange tints.....35
34. Pileus conical or convex and dry; pileipellis a cutis or a very weakly developed ixocutis; stipe yellow, orange or red37

- 35(34). Pileus yellow with orange tints at most, never red**H. dromedensis**
 35. Pileus red.....36
- 36(35). Lamellae broadly adnate, cream coloured with pink tints; stipe yellow with pink and orange tints, cylindrical, 2–5 mm diameter**13. H. erythrocala**
 36. Lamellae very narrowly adnate or usually adnexed to free, pure yellow; stipe pure yellow usually inflated, flattened and with longitudinal grooves, 5–11 mm diameter**26. H. xanthopoda**
- 37(34). Pileus dark olive-green, conical; lamellae pale yellow-green.....**H. viridiconica**
 37. Pileus red, yellow, or olive-brown; lamellae variously coloured.....38
- 38(37). Pileus and stipe lemon-yellow; lamellae free.....**H. luteoconica**
 38. Pileus and stipe variously coloured, red, orange or yellow; lamellae adnate to adnate-arcuate39
- 39(38). Pileus conical, orange-red or olive-brown; stipe yellow to orange-yellow40
 39. Pileus convex and sometimes umbilicate, bright red; stipe red.....41
- 40(38). Pileus orange-red; lamellae broadly adnate, bright yellow; most spores strongly constricted**H. aurantiocampanula**
 40. Pileus olive-brown; lamellae narrowly adnate to adnexed and creamy yellow; spores rarely constricted and then only very slightly.....**H. aurantipes**
- 41(39). Lamellae white or cream coloured when old; pileus occasionally depressed but not frequently or markedly umbilicate, margins even or occasionally a little crenulate**H. kula**
 41. Lamellae-faces pinkish red and with pale pink-lilac margins; pileus convex and umbilicate, margins always strongly crenulate**23. H. sanguineocrenulata**

Key 4: Species of subgenus *Humidicutis*

1. Pileus (and lamellae and stipe) pure white**29. H. mavis**
 1. Pileus (and lamellae and stipe) not pure white2
- 2(1). Lamellae green3
 2. Lamellae yellow or lilac4
- 3(2). Pileus lilac; stipe grey-lilac.....**H. lilacinoviridis**
 3. Pileus olive-green; stipe pallid-green**27. H. helicoides**
- 4(2). Pileus and lamellae lilac.....**28. H. lewellinae**
 4. Pileus dull green to buff-brown; lamellae yellow.....**30. H. woodii**

Subgen. 1 *Cuphophyllus* Donk *Beih. Nova. Hedwigia* 5: 45 (1962). *Species typica*: *Agaricus pratensis* Pers.: Fr. [≡ *Camarophyllus pratensis* (Pers.: Fr.) P.Kumm.]

Basidiome dull coloured or rarely with bright colours in apricots, pinks or lilac to mauve; *lamellae* mostly decurrent; *hymenophoral trama* irregular; cystidia mostly absent; clamps frequent throughout the basidiome.

1. *Hygrocybe aurantiopallens* (E.Horak) A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 921 (1997); *Camarophyllus aurantiopallens* E.Horak, *Beih. Nova Hedwigia* 43: 122 (1973). *Type*: New Zealand, Lake Rotoiti, 29.iv.1968, E. Horak s.n. (holotype PDD 27088).

Misappl.: *Hygrophorus aurantius* Murrill sensu G.Stev., *Kew Bull.* 16: 382 (1963).
Illustrations: Fuhrer & Robinson (1992), p. 38; Young & Wood (1997), p. 922.

Habitat and distribution: Gregarious on soil in subtropical rainforest, wet eucalypt forest and cool temperate rainforest, particularly at the bases of tree ferns. *H. aurantiopallens* is now known from central New South Wales to Tasmania.

Material examined: NEW SOUTH WALES. Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M.Young, (*hb. young.* 2144) (BRI). VICTORIA. Wilsons Promontory NP, 38°55'S 146°23'E, 24.v.1998, A.M.Young, (*hb. young.* 2057) (MEL 2060218).

Remarks: These Victorian and New South Wales collections conform quite well in most details to previous collections. Most collections of this taxon display a more or less irregular hymenophoral trama, however the hyphal organisation of the Victorian collection tended more to a regular or subregular tramal structure rather than strongly irregular. The misapplication of *Hygrophorus aurantius* Murrill by G. Stevenson is covered by Horak (1990), p. 278.

2. *Hygrocybe reesia* A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 923 (1997).
Type: New South Wales. Lane Cove Bushland Park, 17.vi.1990, R. Kearney & B. Rees s.n. (holotype UNSW 90/205).

Illustration: Young & Wood (1997), p. 924.

Habitat and distribution: Gregarious on soil in woodland, forest, or cool temperate rainforest; frequently amongst moss or litter. *H. reesia* is common in both the Sydney region of New South Wales and in Tasmania, not yet recorded for Victoria.

Material examined: NEW SOUTH WALES. Lane Cove Bushland Park, 33°49'S 151°10'E, 7.vi.1998, R. & E. Kearney s.n. (*hb. young.* 2074) (BRI); Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young s.n. (*hb. young.* 2088) (MEL 2060221).

Remarks: The distinct lilac colouration of *Hygrocybe reesia* is prominent in moist basidiomes, however the colours pale to a lilac-tinted buff as drying proceeds. The pileus surface is smooth and the stem base is lilac in contrast to the velvety surface and yellow stem base of *H. cheelii* A.M.Young.

3. *Hygrocybe rodwayi* (Masse) A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 923 (1997); *Hygrophorus rodwayi* Masse, *Bull. Misc. Inf. Kew* 1899: 178 (1899) *Type:* Tasmania. Kingston Rd. (nr. Hobart), s.d., L. Rodway 137 (holotype K). *Camarophyllus rodwayi* (Masse) Monks & A.K.Mills in M.R. Banks *et al.* (Eds), *Aspects of Tasmanian Botany - A Tribute to Winifred Curtis* 13 (1991).

Illustrations: Fuhrer & Robinson (1992), p. 39; Young & Wood (1997), p. 925.

Habitat and distribution: Gregarious to caespitose on soil often amongst moss or litter, in rainforests (subtropical or cool temperate) or wet sclerophyll forests. Common, known from central New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES. Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, F.Taecker, (*hb. young.* 2141) (BRI); Bola Ck., 34°09'S 151°02'E, 15.vi.1998, A.M.Young, (*hb. young.* 2117) (BRI). VICTORIA. Lake Bonney. *Collector and date unknown.* (MEL 1052611); Eildon State Park, 23.iv.1993, N.H.Simott 2627, (MEL 2029288); Black Range SF, 25.vi.1994, N.H.Simott 2986, (MEL 2029289).

Remarks: The decurrent lamellae and the cream discolouration at the centre of the otherwise white pileus are characteristic of this taxon. Microscopically, the small, subglobose spores measuring (4.5–)5–7(–7.5) × 4.5–5.5(–6) µm are very distinctive.

Macroscopically, *H. rodwayi* could be confused with *H. virginea* (Wulfen: Fr.) P.D.Orton & Watling, but the latter species is easily separated microscopically because it has larger, oblong to ellipsoid spores measuring $7.0\text{--}12.5 \times 3.5\text{--}7.5 \mu\text{m}$. *Hygrocybe rodwayi* is common and these collections confirm the presence of the taxon in all eastern states apart from Queensland.

4. *Hygrocybe virginea* (Wulfen: Fr.) P.D.Orton & Watling, *Notes Roy. Bot. Gard. Edinburgh* 29: 132 (1969); *Agaricus virgineus* Wulfen, in Jacq., *Misc. austr.* 2: 104 (1781). *Type*: none designated. *A. virgineus* Wulfen: Fr., *Syst. Mycol.* 1: 100 (1821); *Hygrophorus virgineus* (Wulfen: Fr.) Fr., *Epicr.*: 327 (1838); *Camarophyllus virgineus* (Wulfen: Fr.) P.Kumm., *Führ. Pilzk.*: 117 (1871); *Agaricus niveus* Scop., *Fl. carn.*, Ed.2, 2: 430 (1772); *A. virgineus*, var. *niveus* (Scop.) Fr., *Syst. mycol.* 1: 100 (1821); *Hygrophorus niveus* (Scop.) Fr., *Epicr.*: 327 (1838); *Camarophyllus niveus* (Scop.) Wunsche, *Pilze*: 115 (1877).

Illustrations: Cleland (1934) Plate III as *Hygrophorus niveus* (Scop.) Fr.; Boertmann (1995), p. 49; Young & Wood (1997), p. 929.

Habitat and distribution: Gregarious on soil amongst leaf litter in dense eucalypt woodland or forest or in rainforest. Common in the Sydney region of New South Wales but not yet recorded from other states.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (*hb. young.* 2094) (BRI); Bola Creek - Royal National Park, 34°09'S 151°02'E, 15.vi.1998, A.M.Young, (*hb. young.* 2120) (BRI); Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M.Young, (*hb. young.* 2154) (BRI).

Remarks: These new collections conform well to previous descriptions in Young & Wood (1997) and Young (1999) and to descriptions of European material (Boertmann 1995).

Subgen. 2 *Hygrocybe* Species typica: *Hygrocybe conica* (Schaeff.: Fr.) P.Kumm.

Basidiome frequently vividly coloured (red, orange, yellow); *pileus* often conical; *lamellae* free, adnexed or narrowly adnate; *hymenophoral trama* strictly regular, composed of very long (500–3000 μm), tubular, aseptate elements with tapered ends; cystidia sometimes present; clamps generally present throughout the basidiome.

5. *Hygrocybe astatogala* (R.Heim) Heinemann, *Bull. Jard. Bot. État* 33: 436 (1963); *Bertrandia astatogala* R.Heim, *Rev. Mycol. (Paris)* 31: 155 (1966);. *Type*: Madagascar. (holotype *hb. mus. nat. paris.*, n.v.)

Illustrations: Fuhrer & Robinson (1992), p. 8; Young & Wood (1997), p. 933.

Habitat and distribution: Solitary, gregarious or sometimes in troops amongst leaf litter or moss or directly on soil; often in very sheltered locations. Found in subtropical rainforest, wet eucalypt forest and cool temperate rainforests. Known from southern Queensland, New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES. Bola Creek - Royal National Park, 34°09'S 151°02'E, 15.vi.1998, F.Taeker, (*hb. young.* 2119) (BRI); Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, F.Taeker, (*hb. young.* 2140) (BRI). VICTORIA. Warrendyte State Park, 21.vi.1992, T.W.May & B.A.Fuhrer, (MEL 2030297).

Remarks: The material from Warrendyte appears to be the first confirmed collection of this species from Victoria. The Victorian material agrees with Tasmanian data collected by A.J.Monks (1989). Monks also described Tasmanian variants of *H. astatogala* which differed only in that they had ellipsoid spores rather than the usual subglobose spores.

6. *Hygrocybe cerasinomutata* A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 936 (1997). *Type:* New South Wales, Mt. Wilson, 33°30'S 150°22'E, 21.iii.1982, A.M.Young (*hb. young.* 563) (holotype BRIP 22517).

Habitat and distribution: Gregarious or caespitose in sandy soil amongst wet eucalypt forest leaf litter. Known only from the Sydney region of New South Wales.

Material examined: NEW SOUTH WALES. Bola Creek - Royal National Park, 34°09' S 151°02' E, 15.vi.1998, A.M.Young, (*hb. young.* 2123) (BRI).

Remarks: The Bola Creek collection increases the known geographical range for this species which has previously been collected from the Lane Cove Bushland Park and the Blue Mountains. It confirms that *H. cerasinomutata* is widespread in the Sydney region. The Bola Creek material was less viscid than the holotype, however this character is dependent upon the age of the basidiomes and the prevalent weather conditions. The stipes were not recorded as being viscid so that this character may be a variable one.

7. *Hygrocybe chlorophana* (Fr. : Fr.) Wünsche, *Pilze:* 112 (1877); *Agaricus chlorophanus* Fr., *Syst. Mycol.* 1: 103 (1821). *Type:* none designated. *Hygrophorus chlorophanus* (Fr.: Fr.) Fr., *Epicr.*: 332 (1838).

Misappl: *Hygrocybe flavescens* (C. H. Kauffmann) Singer *sensu* Young & Wood (1997), p. 943.

Illustrations: Boertmann (1995), p. 141; Young & Wood (1997), p. 944.

Habitat and distribution: Gregarious on soil in alpine heath; collections made under *Epacris microphylla* R. Br. and *Leucopogon montanus* (R. Br.) J. H. Willis. Known only from the Kosciusko National Park region of New South Wales.

Remarks: Boertmann (1995) based his description of *H. chlorophana* on material obtained from the Swedish locality from which Fries made the original collection, as well as on collections from a wide range of locations throughout Europe. He found that the degree of stipe viscosity in the basidiomes of any one collection or between the basidiomes of separate collections was extremely variable and ranged from dry to viscid. Boertmann examined European collections of *H. flavescens* and found that the name of *H. flavescens* had "often been assigned to forms of *H. chlorophana* with a dry stipe" (1995, p. 141). He concluded that stipe viscosity of the stipe was so unreliable as a separation criterion that the two forms were conspecific. Boertmann also indicated that the name of *H. flavescens* had been misapplied by European mycologists and that as yet he had no evidence to show that the European species was identical to the American taxon. In view of Boertmann's work, the name originally used for the Kosciusko material in Young & Wood (1997) is now altered.

8. *Hygrocybe conica* (Schaeff.: Fr.) P.Kumm., *Führ. Pilzk.* 111 (1871); *Agaricus conicus* Schaeff., *Fungi Bavar. Palat. nasc.* 4: 2, 1774; *non A. conicus* Scop. (1772); *Agaricus conicus* Schaeff.: Fr., *Syst. mycol.* 1: 103 (1821); *Hygrophorus conicus* (Schaeff.: Fr.) Fr., *Epicr.* : 331 (1838). *Type:* none designated.

Misappl: *Hygrophorus nigrescens sensu auct.*, *non* Quél., *Hygrocybe nigrescens sensu auct.*

Key to varieties of *Hygrocybe conica*

1. Pileus dry to moist; pileipellis a cutis; carpophore blackening on cap, lamellae and stipe2
1. Pileus viscid; pileipellis an ixocutis; carpophore only blackening on stipe
.....var. **tierneyi**
2. Spores broad ellipsoid, 9–11 (–13.5) × 6–7.5 μm, mean Q: ±1.48; on soil, usually amongst short grassvar. **conica**
2. Spores long ellipsoid, 10–14 × 5.5–7.5 μm, mean Q: ±1.93; on sand dunes
.....**8a.** var. **conicoides**

8a. *Hygrocybe conica* var. *conicoides* (P.D.Orton) Boertm., *Fungi of Northern Europe* 1: 162 (1995); *Hygrophorus conicoides* P.D.Orton, *Trans. Brit. Mycol. Soc.* 43: 262 (1960) *Type*: England. Somerset. Bossington, 31.x.1957, P.D.Orton (holotype K. n.v.) *Hygrocybe conicoides* (P.D.Orton) P.D.Orton & Watling, *Notes Roy. Bot. Garden Edinburgh* 29: 131 (1969).

Pileus black, conical, dry. *Lamellae* bright orange, yellow or 'dark'. *Stipe* black above ground, yellow below ground and white at the base.

Spores 10.5–14 × 5.5–7.5 μm, mean 11.5 × 6.1 μm, Q: 1.6–2.4, mean Q: 1.93, long ellipsoid to sub-cylindrical, hyaline, smooth. Remainder of microscopic characters in accordance with var. *conica*. (Fig. 1)

Habitat and distribution: In sand on beach dune. In Australia, known only from Victoria.

Material examined: VICTORIA. 90 Mile Beach (nr. Rotomah Is.), 4.vii.1992, T.W.May 842 (MEL 261046)

Remarks: The field notes with this collection are unfortunately very limited and no dimensions for the fresh material are given. There is no doubt as to the identity of this collection as both its macrocharacters (where known) and its microscopic characters fit the concept of the European taxon sensu Boertmann (1995) perfectly. The field notes also indicate that the stipe is mostly buried in the sand. Herbarium material is jet black. According to Boertmann var. *conicoides* in northwestern Europe is restricted to 'coastal dunes and is often found where the sand is still moving...[and]...is also reported from central Europe and from dry areas in Switzerland' (1995, p. 162). Boertmann further notes that separation from var. *conica* is only on the basis of the longer spores and the habitat and the two varieties are otherwise identical in all respects. This collection is the first record of this taxon for Australia.

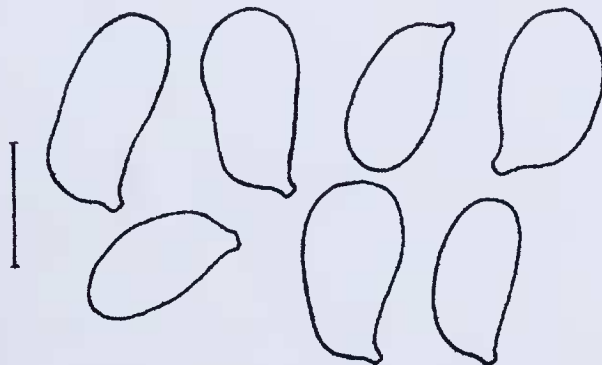


Fig. 1. *Hygrocybe conica* var. *conicoides*. Spores. Bar = 10 μm.

9. *Hygrocybe persistens* (Britzelm.) Singer, *Rev. Mycol. (Paris)* 5: 8 (1940); *Hygrophorus conicus* var. *persistens* Britzelmayr in *Ber. Naturhist. Vereins. Angsbürg* 30: 200 (1890). *Type*: none designated.

Key to varieties of *Hygrocybe persistens*

1. Spores cylindrical to oblong, often constrictedvar. **persistens**
 1. Spores broad ellipsoid to globose, not constricted**9a.** var. **konradii**

9a. *Hygrocybe persistens* var. *konradii* (R. Haller Aar) Boertm., *Fungi of Northern Europe* 1:154 (1995); *Hygrocybe konradii* R. Haller Aar., *Schweiz. Z. Pilzk.* 33: 172 (1955). *Type*: Switzerland [No other information provided]. (holotype BAS, n.v.)

Pileus 20–30 mm, acutely conical becoming umbonate, yellow, viscid when young then drying to a radially fibrose surface; margins lobed, splitting and often striate. *Lamellae* ascending, pale yellow and remaining yellow or then becoming orange or a shade of orange from the start, margins concolorous and even. *Stipe* 40–50 × 4–5 mm, yellow, dry or at first slightly viscid but soon drying, cylindrical, smooth, hollow and readily splitting. Slowly turning grey on bruising.

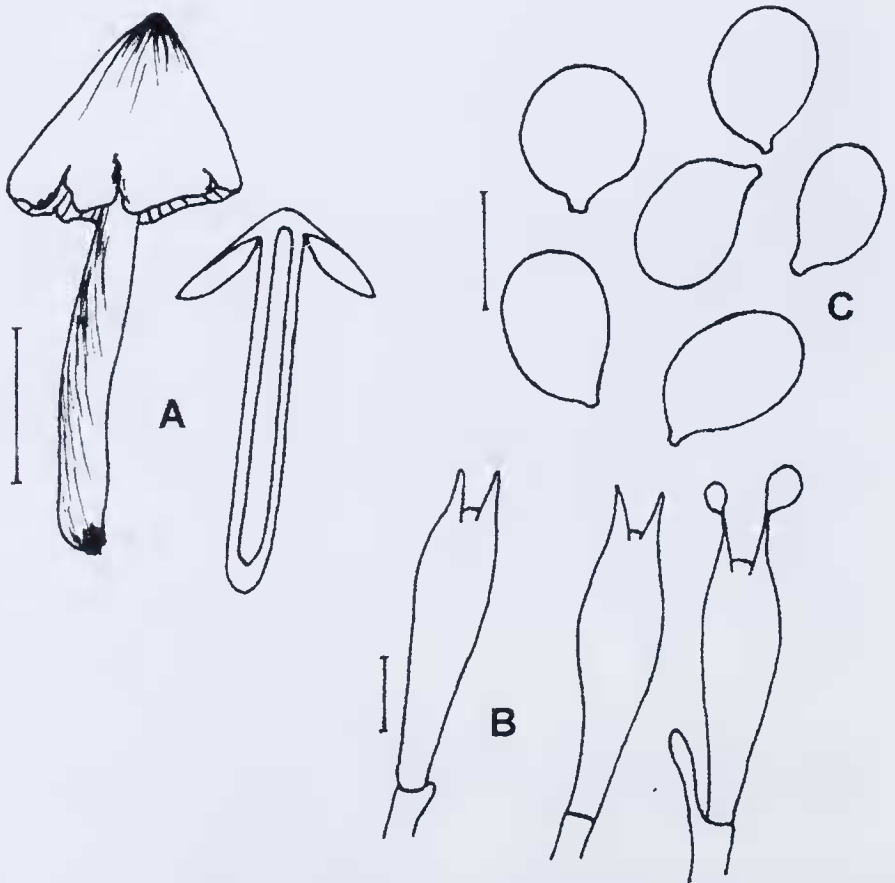


Fig. 2. *Hygrocybe persistens* var. *konradii*. **A** habit; **B** basidia; **C** spores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10µm.

Spores (9.5–)10–13(–14) × 7–9.5(–10.5) μm , mean 11.5 × 8.5 μm , Q: (1.1–)1.3–1.5(–1.7), mean Q: 1.36, very broadly ellipsoid to globose, smooth, hyaline. *Basidia* (29–)32–47 × 9–11(–13) μm , mean 39 × 10.5 μm , Q: 3.0–4.6, mean Q: 3.72, 2-spored, clamps either rare or absent. *Cystidia* absent. *Hymenophoral trama* regular, composed of parallel, hyaline, thin walled, aseptate, tubular elements 9–20 μm diameter with lengths >1000 μm , tapered at their ends; lactifers present as highly refractive, somewhat tortuous hyphae 2–6 μm diameter. *Pileipellis* an ixocutis of hyaline, thin-walled, septate hyphae 3–6 μm diameter, clamps absent. *Stipitipellis* a cutis or a very weak ixocutis with hyaline, thin-walled, cylindrical, aseptate, elements 3–6 μm diameter, clamps absent. (Fig. 2)

Habitat and distribution: Gregarious in short ‘buffalo grass’, *Stenotaphrum secundatum* (Walt.) Kuntze. In Australia, known only from Sydney, New South Wales.

Material examined: NEW SOUTH WALES. North Ryde, 27.ii.1999, R.&E.Kearney & A.M.Young (hb. young, 2201) (BRI).

Remarks: This is the first Australian record of this probably introduced European taxon. The material conforms perfectly with the macroscopic and microscopic characters as detailed by Boertmann (1995). *Hygrocybe persistens* var. *kouradii* resembles a yellow specimen of *H. conica* but does not display any rapid and intense blackening. ‘Buffalo grass’ is the habitat for another possibly introduced taxon: *H. conica* var. *conica* which is normally rare in Australia. Both these species are part of the European ‘grassland flora’ within the Hygrophoraceae and they continue to occupy this habitat in Australia, contrasting with the forest habitat of the majority of Australian species.

10. *Hygrocybe siccitatopapillata* A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 947 (1997). *Type*: New South Wales. Lawson, 30.v.1992, A.E.Wood s.n. (holotype UNSW 92/210).

Illustration: Young & Wood (1997), p. 949.

Pileus 7–16 mm, bright crimson or brilliant scarlet (10A8), resembles an acutely conical to obtusely conical to nearly campanulate form but expanded has the form of a convex pileus with a pronounced and papillate umbo, dry, smooth, margins even and may be slightly striate. *Lamellae* broadly adnate to a little ventricose, orange (6A7) but may be orange-yellow to pinkish yellow, a little distant, two sets lamellulae, margins concolorous and even. *Stipe* 25–45 × 1.0–2.5 mm, orange-red (7A8) to pale crimson with yellowish tints when aged, slightly hollow or pith filled, dry, smooth, cylindrical. No part of the basidiome blackens on bruising.

Spores 7–9.5(–11) × 4.5–6(–6.5) μm , mean 8.5 × 5.3 μm , Q: 1.4–2.1, mean Q: 1.59, ovoid, ellipsoid or amygdaliform, smooth, hyaline, occasionally slightly constricted. *Basidia* 28–40 × 7–11 μm , mean 33 × 9 μm , Q: 2.8–4.8, mean Q: 3.37, 4-spored, clamped. *Cystidia* none. *Hymenophoral trama* regular, composed of hyaline, thin-walled, non-septate elements 1000–1500(–2000) × 10–25 μm , tapered at the ends, sometimes contorted or with capitate apices or branching; lactifers present as highly refractive, hyaline, thin-walled occasionally branching hyphae 2–6 μm . *Pileipellis* a cutis of repent, clamped, thin-walled hyphae 4–10 μm diameter, terminal elements may be slightly clavate; lactifers similar to those of the hymenophoral trama present. *Stipitipellis* a cutis of thin-walled, clamped elements 3–5 μm diameter, medallion clamps sometimes present, contorted hyphae are sometimes scattered over the stipe surface.

Habitat and distribution: Gregarious on soil amongst moss in wet sclerophyll forest. Known only from the type locality.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44’S 150°27’E, 12.vi.1998, A.M.Young, (hb. young, 2090) (BRI).

Remarks: The convex pileus with its very pronounced and papillate umbo may suggest a conical shape. The description now holds details of colour referred to Kornerup & Wanscher (1981) and expanded information for the basidiome macrocharacters.

Subgen. 3 Pseudohygrocybe M. Bon, *Doc. Mycol.* 24: 42 (1976). *Species typica:* *Hygrocybe coccinea* (Schaeff.: Fr.) P.Kumm.

Basidiome variously coloured often brightly (red, orange, yellow, green, lilac); *pileus* conical, convex or umbilicate; *lamellae* narrowly adnate to decurrent; *cystidia* sometimes present as cheilocystidia, rarely as pseudo-pleurocystidia; *hymenophoral trama* regular, subregular to slightly irregular, composed of short, cylindrical to inflated elements 20–300 μm long (rarely up to 700 μm); clamps generally present throughout the basidiome.

11. *Hygrocybe bolensis* A.M.Young, sp. nov.

Pileus 9–20 mm, coccineus, convexus diende plano-convexus ad umbilicatus, viscidulus diende siccus, glaber, ad marginem crenulatus. Lamellae arcuatae vel decurrentes, pallido-aurantiacae, ad marginem pallido-flavae. Stipes 15–23 \times 1.5–3.0 mm, coccineus, viscidulus diende siccus, laevis, cylindricus cum basim angustatus. Sporae 7–9(–9.5) \times 4–5.5(–6) μm , Q: 1.4–1.8(–2.0), ellipsoideae vel sub-cylindricae, aliquot constrictae, hyalinae. Basidia 34–51 \times (6–)7–9 μm , Q: 4.4–7.7, (2-)4-spora, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei cutis vel sub-ixocutis formans. Gregaria vel caespitosa in humo sylvestri.

Type: New South Wales, Bola Creek - Royal National Park, 34°09'S 151°02'E, 15.vi.1998, A.M.Young, (*lb. young*, 2125) (holotype DAR 73954; iso BRI).

Pileus 9–20 mm, brilliant scarlet-red (near 10A8 but brighter), convex becoming plano-convex and then depressed and finally more or less umbilicate, at first slightly viscid or sticky but very quickly becoming dry and moist-hygrophanous, smooth but often appearing very distinctly finely, silky, radially fibrillose (or even sub-rimose) especially when beginning to lose the surface moisture, drying from the centre to become pale buff-red, margin strongly crenulate. *Flesh* white with yellow tints. *Lamellae* arcuate to decurrent, pale orange (near 6B5–6B8), margins even and pale yellow (near 3A3). *Stipe* 15–23 \times 1.5–3 mm, red (near 10A8 but a brighter hue), at first very slightly viscid or sticky but then very quickly dry and appearing polished and smooth, hollow or pith filled, cylindrical or tapered downwards.

Spores 7–9(–9.5) \times 4–5.5(–6) μm , mean 7.5 \times 4.6 μm , Q: 1.4–1.8(–2.0), mean Q: 1.63, smooth, hyaline, ellipsoid or ovoid occasionally sub-cylindrical and often constricted. *Basidia* 34–51 \times (6–)7–9 μm , mean 43 \times 7.4 μm , Q: 4.4–7.7, mean Q: 5.85, 4-spored but 2-spored basidia occasional, clamped. *Cystidia* absent. *Hymenophoral trama* regular composed of chains of inflated, ellipsoid to sausage shaped elements, hyaline, thin-walled, 15–92 \times 4–12 μm , clamps present especially on the non-inflated hyphal elements. *Pileipellis* a cutis or very weak ixocutis of repent, cylindrical, slightly gelatinised, hyaline, non-inflated hyphae 2.5–12 μm diameter, clamps abundant. *Stipitipellis* a cutis or very weak ixocutis of repent, hyaline, cylindrical, non-inflated hyphae 2.5–5.0 μm diameter, clamps abundant. (Fig. 3)

Habitat and distribution: Gregarious or caespitose on soil amongst leaf litter in wet sclerophyll forest. Known only from the type locality.

Remarks: Dried material of this species is characteristically brown capped with a red, almost 'plastic translucent' stipe. The pileus centre almost always forms a central smooth 'pit' or depression during drying whether the pileus was umbilicate or not and the centre is usually a paler brown. It comes close to the European *H. constrictospora* which differs

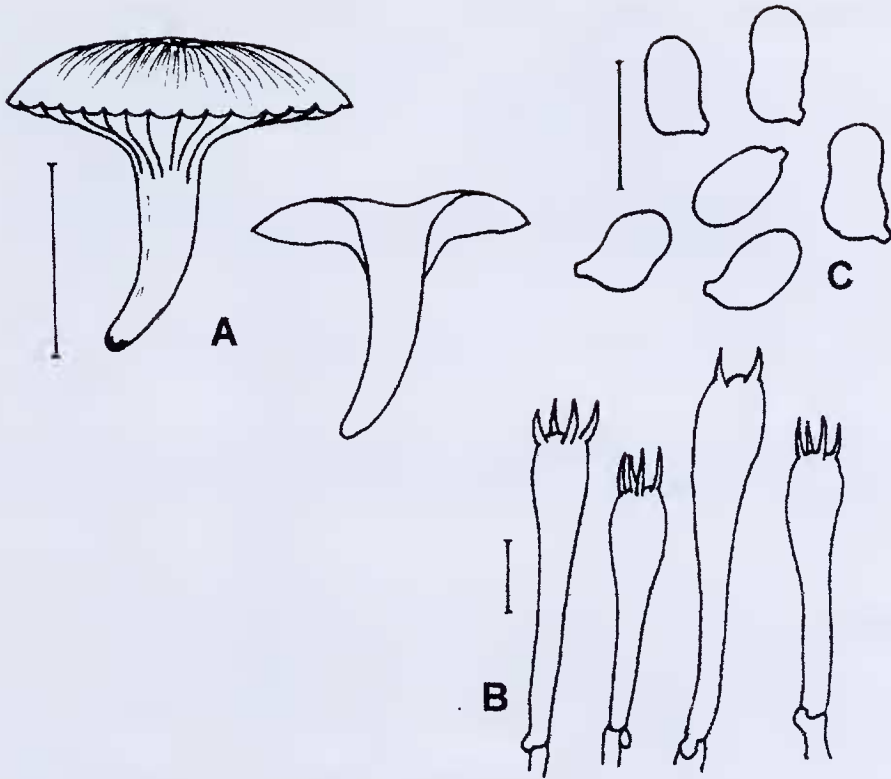


Fig. 3. *Hygrocybe bolensis* (holotype). A habit; B basidia; C normal spores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10µm.

by having yellow stipes and very strongly constricted cylindrical spores (Boertmann 1995). The American species *H. mexicana* Singer differs by having lamellae with at most a decurrent tooth and much shorter basidia ($25\text{--}35 \times 7\text{--}9 \mu\text{m}$) (Hesler & Smith 1963) while the close Sri Lankan taxon *H. similis* (Petch) Pegler has an orange stipe and a pileus which retains its viscosity and develops chrome yellow tints (Pegler 1986). The fibrillose surface of *H. bolensis* is very distinct. The fibrils are not loose and occasionally detached as in *H. astatogala* but are innate in the surface. The macro-appearance of the taxon is reminiscent of a specimen of *H. cantharellus* in which the stipe has been shorted enormously and tapered while the lamellae have been made distinctly orange.

The viscosity of this taxon is extremely difficult to confirm and must be demonstrated in very young basidiomes because the character rapidly disappears with maturity. The appearance of dried material with its slightly varnished surface, especially on the stipe, does suggest the presence of an ixocutis. Microscopic observations also confirm the original viscosity of the surface hyphae of the pileipellis. These surface hyphae usually have large numbers of spores adhering to them and these spores remain firmly attached to the hyphae even after disturbance by mountants.

Etymology: after Bola Creek, Royal National Park, New South Wales, holotype locality.

12. *Hygrocybe chromolimonea* (G.Stev.) T.W.May & A.E.Wood; *Mycotaxon* **54**: 147–150 (1995); *Hygrophorus chromolimoneus* G.Stev., *Kew Bull.* **16**: 383 (1962). *Type*: New Zealand. Lake Rotoiti, 16.v.1956, E.B. Kidson (*hb. stevenson. 1088* holotype K). *Gliophorus chromolimoneus* (G.Stev.) E.Horak, *Beih. Nova Hedwigia* **43**: 167 (1973).

Illustrations: Fuhrer & Robinson (1992), p. 41; Young & Wood (1997), p. 964.

Habitat and distribution: Gregarious on soil in subtropical rainforest, eucalypt forest, or cool temperate rainforest; sometimes on or at the bases of tree ferns. Known from central New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES. Bolla Creek - Royal National Park, 34°09'S 151°02'E, 15.vi.1998, A.M.Young, (*hb. young*, 2130) (BRI). VICTORIA. Wilsons Promontory, 38°55'S 146°23'E, 24.v.1998, A.M.Young, (*hb. young*, 2060) (MEL 2060215); Henry Creek Forest (nr. Nyora), 24.vi.1992, J.H.Willis s.n. (MEL 261049); Lower Glenelg, 15.viii.1964, A.C.Beauglehole 6347 (MEL 2030402).

Remarks: These new collections are the first indications that this taxon is widespread in Victoria.

13. *Hygrocybe erythrocala* A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 970 (1997). *Type:* New South Wales, Mt. Wilson, 33°30'S 150°22'E, A.E.Wood s.n. (holotype UNSW 93/7).

Illustration: Young & Wood (1997), p. 971.

Habitat and distribution: Gregarious on soil in either rainforest or wet sclerophyll forest. Wide spread and common in the Sydney region of New South Wales.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (*hb. young*, 2093) (MEL 2060102); Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M.Young, (*hb. young*, 2155) (BRI).

Remarks: These new collections confirmed the extreme variability of viscosity mentioned in the type description.

14. *Hygrocybe firma* (Berk. & Broome) Singer, *Sydowia* 11: 355 (1957); *Hygrophorns firmus* Berk. & Broome, *Journ. Linn. Soc., Bot.* 11: 563 (1871). *Type:* Sri Lanka, Kandy District, Peradeniya, i.1869, G.H.K. Thwaites 880 (holotype K. n.v.).

Pileus (only one specimen seen) 28 mm, brilliant scarlet (10A8 or brighter), convex and umbilicate, dry, smooth, margin even to a little irregular. *Lamelloae* deeply decurrent, bright pink (9A5) but may have an orange tint, margins even and concolorous. *Stipe* 65 × 4–6 mm, a paler shade of the pileus, hollow to pith filled, dry, smooth, cylindrical.

Macrospores (10-)11.5–15 × (7–)8–10 µm, mean 12.6 × 8.5 µm, Q: 1.3–1.7, mean Q: 1.51, smooth, hyaline, broadly ellipsoid to ovoid. *Microspores* 7–10 × 5–6.5 µm, mean 8.4 × 5.5 µm, Q: 1.3–1.9, mean Q: 1.53, smooth, hyaline, ellipsoid to amygdaliform occasionally slightly constricted. *Macrobasidia* 68–88 × (8.5–)10–12 µm, mean 77 × 11 µm, Q= 6.1–8.1, mean Q= 7.02, 4-spored, clamped. *Microbasidia* 52–67 × 8–11 µm, mean 60 × 9 µm, Q: (5.6–)6.3–7.3(–8.0), mean Q= 6.67, 4-spored, clamped. *Cystidia* none. *Hymenophoral trama* regular composed of hyaline, cylindrical, septate, clamped elements 2.5–13 µm diameter and up to 180 µm long. *Pileipellis* a partially disrupted, dry cutis (or occasionally approaching a very weakly formed trichoderm) of short, inflated, hyaline, clamped elements 12–25 µm diameter. *Stipitipellis* a dry cutis of repent, thin-walled, hyaline, clamped hyphae 3.3–7.5 µm. (Fig. 4)

Habitat and distribution: Solitary in leaf litter; eucalypt forest. In Australia, known only from Victoria.

Material examined: VICTORIA. Lillypilly Gully - Wilsons Promontory, 39°00'S 146°20'E, 23.v.1998, A.M.Young, (*hb. young*, 2054) (MEL 2060217).

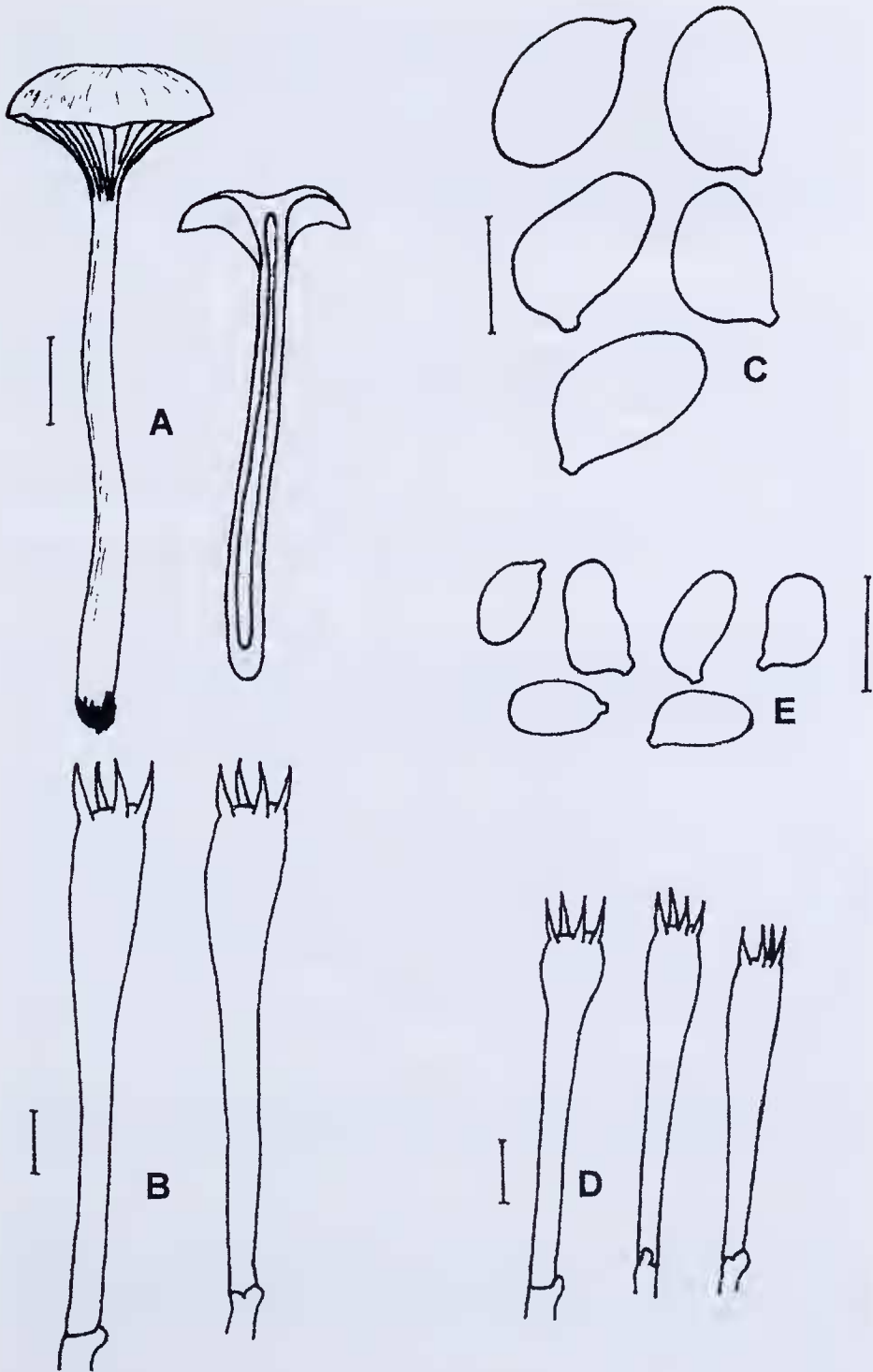


Fig. 4. *Hygrocybe firma*. A habit; B macrobasidia; C macrospores; D microbasidia; E microspores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μm.

Remarks: Only a single basidiome was collected so that a full range of macro- and micro-characters remain to be determined. There are several slightly different interpretations of this taxon (Corner 1936; Pegler & Fiard 1978; Pegler 1983; Horak 1990) but all agree consistently that the taxon is either red (although rapidly fading), orange or yellow, the spores and basidia are dimorphic and that the pileipellis is a pronounced trichoderm. Pegler (1983) found that Antillian material assigned to this taxon exhibited a blackening reaction but Horak (1990) did not note a similar reaction for New Zealand material. This collection has already been mentioned in Ford & May (1998) and it is the first report of this taxon for Australia.

15. *Hygrocybe fuliginosquamosa* (Clel.) Grgur., *Larger Fmgi of South Australia*, 335 (1997); *Hygrophorus fuliginosquamosus* Clel., *Traus. & Proc. Roy. Soc. South Australia* 57: 187 (1933). *Type:* South Australia, Mt. Lofty, 12.vi.1943, J. B. Cleland, (neotype AD 5705; designated Grgurinovic 1997, p. 335).

Illustrations: G. Walsh watercolour no. 19, (AD); Young & Wood (1997), 973.

Habitat and distribution: Occurring on soil in eucalypt forest either solitary or gregarious. Known only from South Australia.

Remarks: Victorian collections at MEL labelled *H. fuliginosquamosa* have proven to be other taxa.

16. *Hygrocybe graminicolor* (E.Horak) T.W.May & A.E.Wood, *Mycotaxon* 54: 148 (1995); *Gliophorus graminicolor* E.Horak, *Beih. Nova Hedwigia* 43: 176 (1973). *Type:* New Zealand, Ngahere, 21.iii.1968, E.Horak, s.n. (holotype PDD 27096).

Hygrocybe batesii A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 956 (1997). *Type:* Australia, New South Wales, Monga State Forest, 16.v.1984, A.E.Wood & N.B.Gartrell s.n. (holotype UNSW 84/522).

Gliophorus pallidus E.Horak, *Beih. Nova Hedwigia* 43: 164 (1973). *Type:* New Zealand, Auckland, 27 June 1968, E.Horak (holotype PDD 27090); *Hygrocybe pallida* (E.Horak) A.M.Young, in Young & Wood, *Austral. Syst. Bot.* 10: 992 (1997) *nom. illeg.*; *non:* *Hygrocybe pallida* (A.H.Smith) Singer, *Beih. Sydowia* 7: 7 (1973).

Misappl.: *Hygrophorus viridis* sensu Young (1986); *Hygrophorus sciophanus* sensu Cooke, 1892.

Illustrations: Fuhrer & Robinson (1992), p. 40; Young & Wood (1997), p. 975 and p. 958 as *H. batesii*.

Habitat and distribution: Solitary to gregarious in 2's or 3's, or caespitose, or in troops on soil in rainforest, wet eucalypt forest and cool temperate rainforest. Widespread and common in eastern Australia and found in New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES, Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (*hb. young*, 2095) (BRI); Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M.Young, (*hb. young*, 2150) (BRI); Bola Creek - Royal National Park, 34°09'S 151°02'E, 15.vi.1998, A.M.Young, (*hb. young*, 2133) (BRI). VICTORIA, Wilsons Promontory, 23.v.1998, A.M.Young, (*hb. young*, 2053) (MEL 2060216); Wilsons Promontory, 38°55'S 146°23'E, 23.v.1998, A.M.Young, (*hb. young* 2058.) (MEL 2060220); Mordialloc, Vic., 11.vi.1889, C.French, (MEL 1052499); Lower Glenelg, Vic., 25.vi.1964, H.M.Beaglehole 6343 (MEL 1055416); Lower Glenelg, Vic., 12.vii.1964, A.C.Beaglehole 6226 (MEL 1055431).

Remarks: The colour variations of this taxon are extensively discussed in Young (1999). The 1889 collection from Mordialloc (C. French, MEL 1052499) is labelled as *Hygrocybe sciophana* (Fr.) Wünsche. Boertmann (1995) considers *H. sciophana* to be

synonymous with *Hygrocybe psittacina* var. *perplexa* (A.H. Smith & Hesler) Boertm. which is noted as being different only from the typical green variety of *Hygrocybe psittacina* in that var. *perplexa* is brick-red. *Hygrocybe psittacina* has not been recorded for Australia. It is very probable that the Mordialloc collection was made from specimens of *H. graminicolor* which were displaying the deep, reddish brown colour variation. The listing of *Hygrophorus sciophanus* (Fr.) Fr. by Cooke (1892) is considered erroneous and based either on this collection or a similar one. With the exception of the 1889 collection, herbarium material consistently exhibited the brick pink colouration typical of dried *H. graminicolor*. The Mordialloc collection has become more brownish, probably through the passage of time, but still suggests the original colour.

17. *Hygrocybe hayi* A.M.Young, *Austral. Syst. Bot.* 10: 976 (1997). Type: Queensland. Blackbutt, 2.v.1988, A.M.Young s.n. (*hb. young*, 1267), (holotype BRIP 22520).

Illustration: Young & Wood (1997), p. 977.

Habitat and distribution: Gregarious on soil in long grass in sclerophyll woodland. Known from Queensland and Victoria.

Material examined: Kilmore Memorial Reserve, Vic., 15.vii.1993, *H. Manson* 45 (MEL 261048).

Remarks: The Victorian collection is the second record of this species. Unfortunately, the herbarium material was accompanied by only very brief field notes but the brilliant scarlet-red and slimy pileus are clearly noted. A comparison of the Victorian material with the holotype shows that the ranges of sizes of most characters overlaps considerably, especially those of the spores. Other microcharacters also support the identity of the Kilmore collection which has a clamped ixocutis on both the pileus and the stipe and inflated elements in the hymenophoral trama. These characters are also found in the holotype.

The present disjoint distribution of this taxon is probably because its habitat appears to be the dryer sclerophyll woodlands. These dry woodlands are not as favourable for basidiome production as the wet forests in which many of the Australian Hygrophoraceae occur, and so basidiomes of *H. hayi* may only appear under infrequent 'perfect conditions.' Such conditions may only occur at long periods of time and the presence of field workers in the right place at the right time then becomes the critical factor. It is likely that the species does occur in various localities from Victoria to Queensland but its sporadic basidiome production will mean that further knowledge of its distribution will be difficult to obtain.

The viscid *Hygrocybe hayi* approaches the non-viscid *H. flammans* (Berk.) A.M.Young, however the broadly ellipsoid spores and pink tinted yellow lamellae found in the former species separate it from *H. flammans* which has cylindrical spores and 'livid red' lamellae.

18. *Hygrocybe hypospoda* A.M.Young, sp. nov.

Pileus 10–30 mm, aurantiaco-brunneus, convexus, umbilicatus, siccus, glaber, ad marginem subcrenulatus. Lamellae decurrentes, pallido-aurantiaco-griseae denique aurantiacae, ad marginem concolores. Stipes 40–50 × 2–3 mm, auranticacus, siccus, laevis, cylindricus. Sporae 9–11.5 × 5–8 μm, Q: 1.4–1.9, ellipsoideae vel ovoideae, aliquot subconstrictae vel constrictae, hyalinae. Basidia 44–54 × 6–9 μm, Q: 5.8–8.2, 2-sporea, defibulata rara fibulata. Cystidia nulla. Trama hymenophoralis regularis, haud fibulata rara fibulata. Epicutis pilei cutem eformans. Gregaria in humo sylvestri.

Type: Victoria. Wilsons Promontory, 39°01'S 146°20'E, 23.v.1998, A.M.Young, (*hb.*

young. 2051) (holotype MEL 2056603; isotype BRI).

Pileus 10–30 mm, orange brown (6D8) then paling a little (6C8) with age, convex expanding to broadly convex and always more or less umbilicate, dry, smooth becoming a little scurfy on drying, margin a little crenulate and finely striate when moist. *Lamellae* decurrent, at first pallid orange-grey (paler than 6B2) and sometimes with a lilac tint, becoming orange grey (4B5) and finally light orange (4A5), thick, distant, margins even and concolorous. *Stipe* 40–50 × 2–3 mm, orange (5A7–5B7), dry, hollow, cylindrical, smooth.

Spores 9–11.5 × 5–8 μm, mean 9.8 × 6.1 μm, Q: 1.4–1.9, mean Q: 1.63, ellipsoid, ovoid or obovoid and occasionally to frequently constricted, smooth, hyaline. *Basidia* 44–54 × 6–9 μm, mean 49 × 7.4 μm, Q: 5.8–8.2, mean Q: 6.73, 2-spored, clamps rare or absent. *Cystidia* absent. *Hymenophoral trama* regular, composed of chains of cylindrical to ellipsoid, hyaline, thin walled, inflated elements 40–125 × 6–30 μm, clamps absent or rare. *Pileipellis* a cutis of hyaline, thin walled, cylindrical, septate hyphae 2–12 μm diameter, clamps absent or rare. *Stipitipellis* a cutis of hyaline, thin walled, cylindrical, septate hyphae, 1–5 μm diameter, clamps absent or rare. (Fig. 5)

Habitat and distribution: Caespitose or gregarious in litter beside track in eucalypt woodland. Known only from the type locality.

Remarks: *Hygrocybe hypospoda* approaches the American taxon *Hygrophorus trojanus* (Murr.) Murr. but that taxon has strongly violaceous lamellae and a rust brown

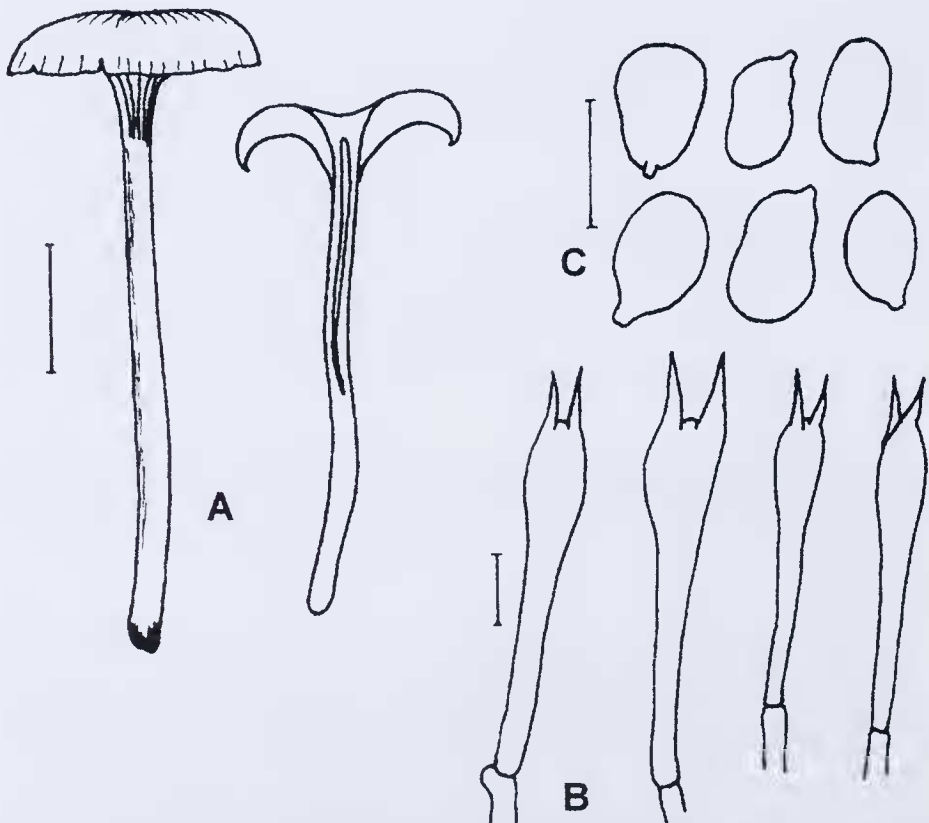


Fig. 5. *Hygrocybe hypospoda* (holotype). A habit; B basidia; C spores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μm.

pileus (Hesler & Smith 1963). The absence of clamps is possibly linked to the spore number of the basidia: there are two-spored variants of *H. conica* which also display an absence of clamps throughout the basidiome. No other Australian species has this combination of characters.

Etymology: Greek, *hypo*, beneath; Greek, *spodos*, ash grey; referring to the pale undertint of grey at first present on the lamellae.

19. *Hygrocybe leucogloea* A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 976 (1997). *Type*: New South Wales. Mt. Wilson, 33°30'S 150°22'E, 29.iv.1989, A.E.Wood s.n. (holotype UNSW 89/87).

Illustration: Young & Wood (1997), p. 984.

Habitat and distribution: Gregarious on soil in rainforest, or at least in sheltered areas. Known from New South Wales and Victoria.

Material examined: VICTORIA. Black Range State Forest. 25.vi.1994, N.H. Sinnot 2985 (MEL 261035).

Remarks: This is the second known collection of this glutinous, white taxon. The type collection was made in sub-tropical rainforest; the Victorian material was collected under introduced *Cupressus lusitania*.

20. *Hygrocybe lilaceolamellata* (G.Stev.) E.Horak, *New Zealand J. Bot.* 9: 434 (1971); *Hygrophorus lilaceolamellata* G.Stev., *Kew Bull.* 16: 378 (1962). *Type*: New Zealand. Wellington, 2.vi.1949, G.Stevenson, (*hb. stevenson. 619*, holotype K).

Illustrations: Fuhrer & Robinson (1992), p. 42; Young & Wood (1997), p. 985.

Habitat and distribution: Gregarious on soil or moss banks in sclerophyll woodland, wet sclerophyll forest, subtropical rainforest or cool temperate rainforest. In Australia, known from New South Wales and Tasmania.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M. Young (*hb. young. 2087*) (BRI); Hazelbrook, 33°44'S 150°27'E, 16.vi.1998, A.M.Young. (*hb. young. 2137*) (MEL 2060219).

Remarks: These additional collections rectify an error in the macro-description of Young & Wood (1997) p. 983 which stated that lilac tints at the pileus margin were likely to be present in immature material. This is incorrect because that observation was based on very strongly lilac tinted basidiomes now known to be *H. anomala* var. *ianthinomarginata* A.M.Young. No collections correctly assigned to *H. lilaceolamellata* have shown a marginal lilac colouration of the pileus which remains a more or less uniformly brown to reddish brown. Any lilac colourations remain confined to the lamellae or occasionally to the stem-base.

21. *Hygrocybe miniata* (Fr.: Fr.) P.Kumm., *Führ. Pilzk.*: 112 (1871); *Agaricus miniatus* Fr.: Fr., *Syst. Mycol.* 1: 105 (1821). *Type*: Sweden. Smoland, 21.ix.1980, M. Moser 80/372, (neotype: IB. n.v.: designated by Arnolds, 1986, p. 148). *Hygrophorus miniatus* (Fr.: Fr.) Fr., *Epicr.*: 330 (1838).

Illustrations: Horak (1990), Plate 4, fig. 2; Young & Wood (1997), p. 989.

Habitat and distribution: Gregarious to caespitose on soil in rainforests or woodland, occasionally heath land. Known from Queensland, New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES. Bola Creek-Royal National Park, 34°09'S 151°02'E, 15.vi.1998, A.M. Young, (*hb. young*, 2122) (BRI). VICTORIA. Wilsons Promontory, 38°55'S 146°23'E, 24.v.1998, A.M. Young, (*hb. young*, 2061) (MEL 2060103), (*hb. young* 2062) (MEL 2060145).

Remarks: The Wilson Promontory collections confirm the presence of this fairly widespread taxon in Victoria. The Australian material conforms with exemplar herbarium material identified as *H. uiniata* forwarded for my examination by both E. Arnolds (L) and D. Boertmann.

22. *Hygrocybe pseudograminicolor* A.M. Young in Young & Wood, *Austral. Syst. Bot.* 10: 992 (1997). *Type:* New South Wales. Mt. Wilson, 33°30'S 150°22'E, 26.iii.1994, *F. Taeker s.n.* (holotype UNSW 94/22).

Illustration: Young & Wood (1997), 994.

Habitat and distribution: Gregarious on soil in subtropical rainforest or cool temperate rainforest. Although found only in small numbers in the type locality, the species is common and widespread in Tasmania.

Material examined: NEW SOUTH WALES. Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M. Young, (*hb. young*, 2148) (BRI).

Remarks: This second collection from the type locality confirmed the holotype description.

23. *Hygrocybe sanguineocrenulata* A.M. Young in Young & Wood, *Austral. Syst. Bot.* 10: 995 (1997). *Type:* New South Wales. Mt. Wilson, 33°30'S 150° 22'E, 28.iv.1982, A. E. Wood *s.n.* (holotype UNSW 82/187).

Illustration: Young & Wood (1997), p. 996.

Pileus 10–19 mm, very deep red (10B8–10C8), hemispherical then rapidly umbilicate, smooth or a little scurfy on drying, dry, margin finely crenulate and slightly paler. *Lamellae* adnate or arcuate decurrent, pink flushed (near 10A5), distant, margins distinctly pink-lilac so that the lamella area looks pale magenta. *Stipe* 27–40 × 1.5–3.0(–4) mm, red (10B8–10C8), dry, solid or slightly hollow, tapering downwards, smooth, often sinuous. Spore print colour unknown.

Spores 7.5–9.5(–10) × (4–)4.5–5.5(–6) μm, mean 8.6 × 4.8 μm, Q: (1.5–)1.6–2.0(–2.3), mean Q: 1.80, ellipsoid, oblong or lacrymoid, sometimes a few with weak medial constrictions, hyaline, smooth, non-amyloid. *Basidia* 41–60 × 7–9.5 μm, mean 49 × 7.7 μm, Q: 5.9–7.3(–8.3), mean Q: 6.51, 4-spored, clamped. *Cystidia* absent. *Hymenophoral trama* regular, composed of hyaline, thin-walled, clamped, inflated elements 30–75 × 4–14 (–20) μm. *Pileipellis* a cutis up to 80 μm deep, of radially repent, hyaline, thin-walled, clamped hyphae 6–10 μm, overlying a subpellis of hyaline, thin-walled, clamped, inflated cells 30–80 × 16–24 μm. *Stipitipellis* a cutis of hyaline, thin-walled, clamped hyphae 1.5–6 μm.

Habitat and distribution: Gregarious in soil amongst rainforest litter. Known only from New South Wales.

Material examined: NEW SOUTH WALES. Mt. Wilson, 33°30'S 150°22'E, 17.vi.1998, *F. Taeker*, (*hb. young*, 2153) (BRI).

Remarks: This second collection differs slightly from the holotype collection in that the lamellae are pink flushed with lilac tints. These colours suggest a form of the Tasmanian taxon *Hygrocybe erythrocrenata* Mills & Monks which produces a white

spore print that displays a distinct magenta tint if the spores are scraped together into a small mass. Future collections of *H. sanguineocrenulata* should be checked for the presence of this magenta tint in the fresh, massed spores. The possibility remains that *H. sanguineocrenulata* is synonymous with *H. erythrocrenata*.

24. *Hygrocybe stevensoniae* T.W.May & A.E.Wood, *Mycotaxon* **54**: 148 (1995); *Hygrophorus viridis* G.Stev., *Kew Bull.* **16**: 383 (1963) *Type*: New Zealand. Levin. 26.vi.1948. G.Stevenson, (*hb. stevenson.* 338, holotype K) *Gliophorus viridis* (G.Stev.) E.Horak, *Beih. Nova Hedwigia* **43**: 173 (1973); non *Hygrocybe viridis* Capelari & Maziero, *Mycotaxon* **33**: 192 (1988).

Misappl.: *Hygrophorus psittacinus* sensu Cleland & Cheel (1919), and Willis (1963). *Hygrocybe psittacina* sensu Shepherd & Totterdell (1988).

Illustrations: Stevenson (1963), Plate 8, fig. 1; Fuhrer & Robinson (1992), p. 41; Young & Wood (1997), p. 998.

Habitat and distribution: Gregarious on soil in rainforest or sclerophyll forest amongst litter and usually on soil. Known from New South Wales and Tasmania.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (*hb. young.* 2096) (MEL 2060101); Hazelbrook, 33°44'S 150°27'E, 16.vi.1998, A.M.Young, (*hb. young.* 2136) (BRI); Mt.Wilson, 33°30'S 150°22'E, 17.vi.1998, F.Taeker, (*hb. young.* 2146) (BRI); Mt.Wilson, 33°30'S 150°22'E, 17.vi.1998, A.M. Young, (*hb. young.* 2149) (MEL 2060222).

Remarks: All collections examined were similar to the holotype in that they had viscid to glutinous, green basidiomes with no gluten thread or cheilocystidia on the lamellae. *Hygrocybe stevensoniae* usually has spores with lengths of 7–10 µm, however some variation has been found with collections varying from 6–8, 6–9 or 7–9 µm. These differences suggest that strains or varieties may exist.

25. *Hygrocybe sylvaria* A.M.Young in Young & Wood, *Austral. Syst. Bot.* **10**: 999 (1997). *Type*: New South Wales. Mt. Wilson, 33°30'S 150°22'E, 22.vi.1981, A.E.Wood s.n. (holotype UNSW 81/321).

Illustration: Young & Wood (1997), p. 1001.

Pileus 5–18 mm, brilliant scarlet (10A8), convex to campanulate or very broadly conical, smooth, slightly viscid, margin striate and slightly crenulate. *Lamellae* very pale yellow (near 2A2) with a pink flush, broadly adnate and sometimes with a decurrent tooth, widely spaced, margins concolorous. *Stipe* 20–35 × 1–2 mm, brilliant scarlet (10A8), slightly viscid, solid, cylindrical, smooth.

Spores 7–9 × (3.5–)4–5.5 µm, mean 7.7 × 4.5 µm, Q: 1.4–2.2, mean Q: 1.70, ellipsoid to oblong, medially constricted in up to 40% of the spores, hyaline, thin-walled, non-amyloid, apiculus prominent. *Basidia* 33–47 × 7–9 µm, mean 40 × 7.6 µm, Q: 4.5–6.7, mean Q: 5.4, 4-spored, clamped. *Cystidia* absent. *Hymenophoral trama* very regular and composed of chains of parallel, hyaline, inflated, thin-walled, clamped cells that are often constricted at the septa, 27–44 × 3–11 µm. *Pileipellis* an ixocutis of repent, partly gelatinised, hyaline, abundantly clamped (occasionally with medallion form) hyphae, 2–8 µm diameter. *Stipitipellis* an ixocutis of hyaline, clamped hyphae 2.5–4.0 µm, lactifers present as highly refractive, tortuous, vascular hyphae, 2–5 µm diameter.

Habitat and distribution: Caespitose or gregarious on soil amongst litter in wet sclerophyll forest. Known only from the Blue Mountains area of New South Wales.

Material examined: NEW SOUTH WALES. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (hb. young. 2100) (BRI).

Remarks: This collection has provided precise colour indicators for the pileus, lamellae and stipe. It differs from the holotype in the lengths of the tramal elements but this is not considered significant as these lengths can vary with the collection in many species and may also vary depending upon which section of the lamella is measured. Tramal elements in the upper part of the lamellae are usually longer than tramal elements near the lamellae margins.

26. *Hygrocybe xanthopoda* A.M.Young, sp. nov.

Pileus 16–40 mm, coccineus, conicus ad lato-conicus vel subconvexus diende applanatus, viscidus, glaber, ad marginem crenulatus. Lamellae adnatae vel adnexae vel subliberae, flavae, distantes, ad marginem concolores. Stipes 22–40 × 3.5–11 mm, flavus



Fig. 6. *Hygrocybe xanthopoda* (holotype). A habit; B basidia; C spores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μ m.

diende aurantiaco-flavus, siccus, cylindricus. laevis, cavus. Sporae (7.5–)8.5–10 × 5–7 μm , Q: 1.4–1.7(–1.9), ellipsoideae, hyalinae. Basidia (40–)46–56(–59) × 8–12 μm , 4-sporea, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei ixocutem formans. Gregaria in humo sylvestri.

Type: Victoria. Wilsons Promontory, 38°55'S 146°23'E, A.M.Young, (*hb. young*, 2065) (holotype MEL 2056604).

Pileus 16–40 mm, scarlet (10A8) but mixed with yellow tints (4A5) especially at the margin; conical to broadly conical or near convex expanding to obtuse conical and finally plane or repand, viscid, smooth; margins crenulate. *Lamellae* narrowly adnate or adnexed to occasionally sub-free, distant, thick, yellow (4A4–3A4) and without any pink tones; margins concolorous and even. *Stipe* 22–40 × 3.5–11 mm, yellow (3A6) then orange yellow (4A7); dry, cylindrical or inflated, but sometimes tapered at the very base, smooth, hollow.

Spores (7.5–)8.5–10 × 5–7 μm , mean: 9 × 5.8 μm , Q: 1.4–1.7(–1.9), mean Q: 1.55 ellipsoid to broadly ellipsoid, smooth, hyaline. *Basidia* (40–)46–56(–59) × 8–12 μm , mean 50 × 10 μm , Q: 3.6–6.6, mean Q: 5.04; 4-spored, clamped and some of medallion form. *Cystidia* absent. *Hymenophoral trama* regular, and composed of chains of thin walled, hyaline, often fusiform elements (but may be subglobose to tapered cylindrical), 25–70 × 7–23 μm , clamps abundant. *Pileipellis* a loose ixocutis of hyaline, thin walled, cylindrical, clamped hyphae 2.5–5.7 μm , diameter. *Stipitipellis* a cutis of hyaline, thin walled, cylindrical, clamped hyphae 1.5–6 μm diameter. (Fig. 6)

Habitat and distribution: Gregarious to caespitose on soil amongst deep litter in wet eucalypt forest gully. Known only from the type locality.

Remarks: *H. xanthopoda* approaches the New Zealand taxon *Hygrocybe cavipes* E.Horak, but that species differs by having an orange-red, viscid stipe, very broad, clavate basidia and much longer elements (approximately 150 μm) in the hymenophoral trama.

Etymology: Greek, *xanthos*, yellow; Greek, *podion*, a foot; in reference to the yellow stipe.

Subgen. 4 *Humidicutis* Singer, *Sydowia* 2: 28 (1948). *Species typica*: *Hygrophorus marginatus* Peck.

Basidiome variously coloured white, pink, dull orange, green, yellow, or lilac; *pileus* usually conical becoming umbonate or plane and frequently splitting radially; *lamellae* narrowly adnate, adnexed or more or less free; *cystidia* absent; *hymenophoral trama* regular, composed of short, cylindrical to inflated (often moniliform) elements 20–300 μm long; clamps absent throughout the basidiome except at the bases of the basidia and then frequently of medallion form.

27. *Hygrocybe helicoides* A.M. Young, sp. nov.

Pileus 20–35 mm, olivaceus, convexus ad umbonatus, siccus, glaber, ad marginem juniores involutus. *Lamellae* adnatae vel sinuatae, viridae, ad marginem concolores. *Stipes* 40–50 × 2–7 mm, subviridis, siccus, laevis, cavus, cylindricus, ad basim brunneus. *Sporae* 7–9 × 4.5–7 μm , Q: 1.2–1.8, lato-ellipsoideae ad subgloboasae, rara subconstrictae, hyalinae. *Cystidia* nulla. *Trama* hymenophoralis regularis, haud fibulata. *Epicutis* pilei cutem formans; hyphae cuticularis cum pigmentae spiralis vel cylindricus. *Gregaria* in humo sylvestri.

Type: New South Wales. Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young, (*hb. young*, 2086) (holotype DAR 73953).

Pileus 20–35 mm, dark olive green (28E8), convex to a little umbonate, old pilei sometimes depressed at the centre, smooth, dry; margin even, at first involute and sometimes slightly striate. *Lamellae* adnate or sinuate, lime-green (near 30A6), distant, thick, veins present on lamellae faces, margins even and concolorous. *Stipe* 40–50 × 2–7 mm, pallid green superiorly (30A2–30A3) grading to brownish at the base (near 4B4), smooth, dry, hollow, cylindrical.

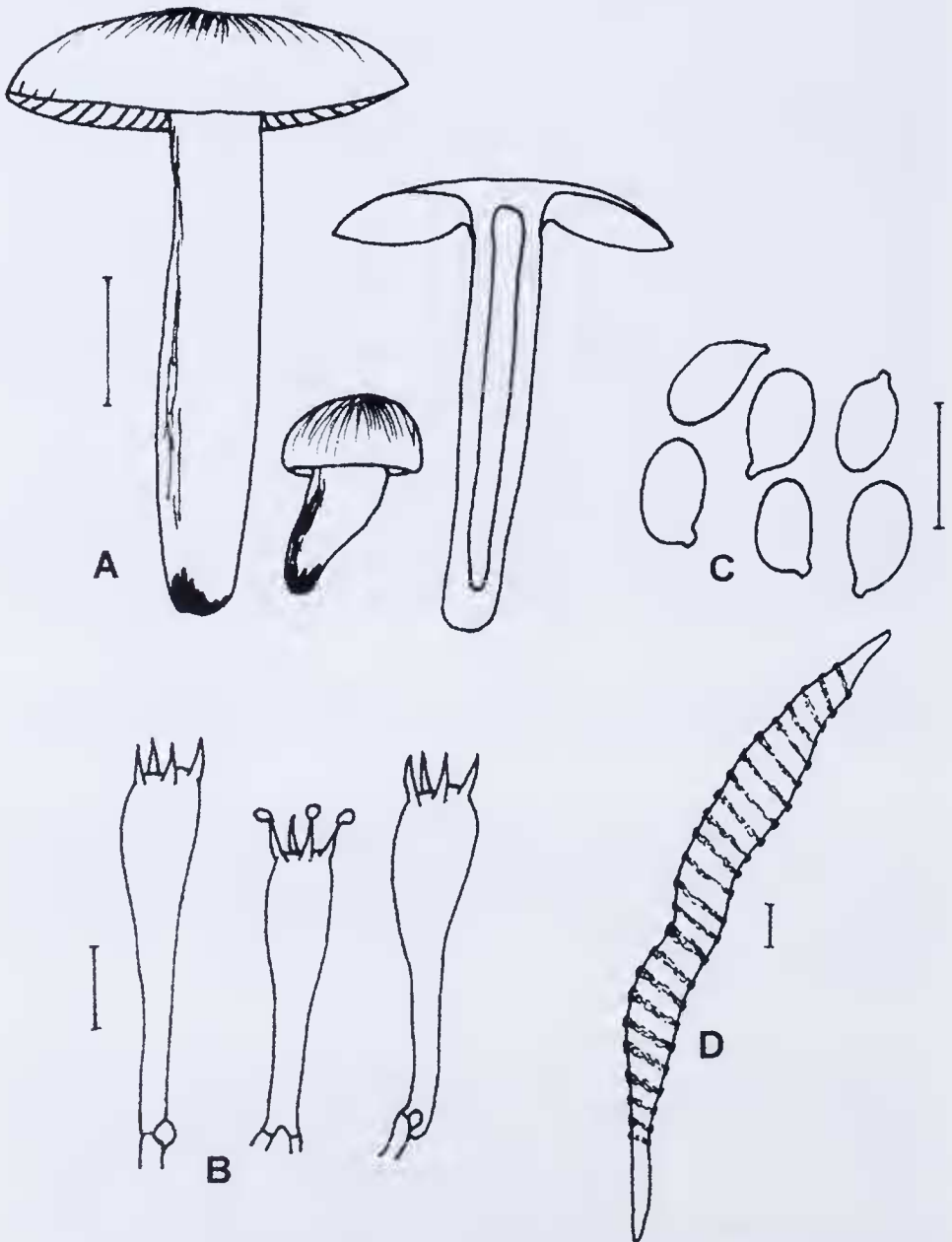


Fig. 7. *Hygrocybe helicoides* (holotype). A habit; B basidia; C spores; D pileipellis hypha showing spiral, cylindrical markings. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μ m.

Spores $7-9 \times 4.5-7 \mu\text{m}$, mean $7.8 \times 5.6 \mu\text{m}$, Q: 1.2–1.8, mean Q: 1.58, broadly ellipsoid, rarely slightly constricted, smooth, hyaline. *Basidia* $36-47 \times 7-9.5 \mu\text{m}$, mean $39 \times 8.3 \mu\text{m}$, Q: 4.0–5.1(–6.2), mean Q: 4.76, 4-spored, clamped and occasionally/often approaching medallion form. *Cystidia* absent. *Hymenophoral trama* regular, composed of hyaline, thin walled, inflated and often fusoid elements $30-160 \times 8-30 \mu\text{m}$. clamps rare or absent. *Pileipellis* a cutis of repent, cylindrical, septate hyphae $5-15 \mu\text{m}$ diameter; pigment present as faint spiral or circular bands on the cuticular hyphae and forming darker points on the hyphal walls when seen in silhouette, clamps absent. *Stipitipellis* a cutis of repent, cylindrical, septate, thin walled hyphae $2.5-9.2 \mu\text{m}$ diameter, clamps absent, with a pigment arrangement similar to that seen on the pileipellis cuticular hyphae. (Fig. 7)

Habitat and distribution: Gregarious in leaf litter in wet sclerophyll forest. Known only from the type locality.

Remarks: The pileus contains spindle-shaped or fusoid tramal elements with spiral or circular markings on their walls. The markings are fine but very distinctive and readily observed. In perspective, a cuticular hypha shows a line of pigment across the hyphal diameter with a darker and rather narrow ellipsoid ‘dash’ on the hyphal wall at each end of the pigment line where there exists a greater depth of pigment. The bands may be diagonal (forming a spiral) or at right angles (forming a ring) to the hyphal axis. No other members of this sub-genus are known to have these basidiome colours and the spiral patterns on the fusoid elements of the pileal cuticle.

Etymology: Greek, *helicoides*, of winding or spiral form - referring to the often spiralled form of the pigment bands on the cuticular hyphae of the pileus.

28. *Hygrocybe lewellinae* (Kalchbr.) A.M.Young in Young & Wood, *Austral. Syst. Bot.* 10: 1011 (1997); *Hygrophorus lewellinae* Kalchbr., *Proc. Linn. Soc. New South Wales* 7: 105 (1882). *Type:* Victoria. Western Port, 14.vi.1880, M. M. R. Lewellin, (holotype, R[are] B[ook] Mss A11, MEL) .

Illustrations: Willis (1957); Cole, Fuhrer & Holland (1978), plate 3.

Habitat and distribution: Gregarious on soil or amongst moss in subtropical rainforest, warm temperate rainforest, wet eucalypt forest, cool temperate rainforest or heath; known from New South Wales, Victoria and Tasmania.

Material examined: NEW SOUTH WALES Hazelbrook, $33^{\circ}44'S$ $150^{\circ}27'E$, 12.vi.1998, A.M.Young, (*hb. young. 2083*) (BRI); Bola Creek- Royal National Park, $34^{\circ}09'S$ $151^{\circ}02'E$, 15.vi.1998, A.M.Young, (*hb. young. 2121*) (BRI); Mt. Wilson, $33^{\circ}30'S$ $150^{\circ}22'E$, 17.vi.1998, F.Taeker (*hb. young. 2139*) (BRI). VICTORIA. Lower Glenelg NP, 14.vi.1964, A.C.Beauglehole 6084 (MEL 1053043); Lower Glenelg R., 28.vi.1964, A.C.Beauglehole 6163 (MEL 1053044); Lower Glenelg NP, 4.vii.1964, A.C.Beauglehole 6534 (MEL 2030400); Enoch's Point, 12.x.1974, A.Morrison s.n. (MEL 261036); Grampians NP, 1.vii.1994, I.McCann GACU66 (MEL 2030401); Mornington Peninsula, 28.v.1996, J.Eichler 27 (MEL 2032944).

Remarks: Originally collected in Victoria and considered rare, *Hygrocybe lewellinae* is reasonably common in the Blue Mountains/Hawkesbury region of New South Wales, Tasmania and on current evidence appears to be reasonably widespread (if not common) in Victoria. Spore lengths for this taxon are commonly in the range of $7.5-10 \mu\text{m}$, but occasional collections may yield spores up to $12 \mu\text{m}$ long. The medallion clamps at the bases of the basidia may be difficult to find in old or dried material as these structures frequently tear apart in the middle of the medallion clamp, however the Y-shaped basidial bases that then remain are a very strong indication that medallion clamps were originally present.

29. *Hygrocybe mavis* (G.Stev.) E.Horak, *New Zealand J. Bot.* 9: 434 (1971); *Hygrophorus mavis* G.Stev., *Kew Bull.* 16: 377 (1962). *Type:* New Zealand. Levin, 18.vi.1949, G. Stevenson, (*lib. stevenson. 654* holotype K).

Misappl.: *Hygrophorus purus* Peck, sensu E.Horak, *New Zealand J. Bot.* 28: 294 (1990).

Habitat and distribution: Gregarious on soil in subtropical rainforest, wet eucalypt forest and cool temperate rainforest. Known from Queensland, New South Wales, Victoria and Tasmania.

Material examined: VICTORIA, Mornington Peninsula, 28.v.1996, J.Eichler 28, (MEL 2032945).

Remarks: This collection is the first record of this taxon for Victoria. This pure white species is obviously very close to the lilae *H. lewellinae* and the colour difference remains the only valid means of separation at the moment. The possibility that *H. mavis* is a white variant of *H. lewellinae* was suggested in Young & Wood (1997).

30. *Hygrocybe woodii* A.M.Young, *Austral. Syst. Bot.* 10: 1009 (1997). *Type:* New South Wales, Watagan State Forest, 17.vi.1987, A. E. Wood, F. Taeker & B. Rees s.n. (holotype UNSW 87/243).

Illustration: Young & Wood (1997), 1010.

Habitat and distribution: Gregarious on soil in wet sclerophyll forest. Known only from the holotype locality.

Remarks: In Young & Wood (1997), this taxon was placed erroneously in subgenus *Pseudohygrocybe*. The absence of elamps throughout the basidiome, except at the bases of the basidia, together with the chains of fusiform elements in the trama of the basidiome, suggest that the species should be transferred to subgenus *Humidicutis*.

Genus 2. *Camarophylloopsis* Herink, *Sborn. Severočesk. Mus., Přír. Vědy* 1: 61 (1958). *Species typica:* *Camarophylloopsis schulzeri* (Bres.) Herink.

Basidiome thin to fleshy, small, dull coloured in grey to ochre or brown; *pileus* convex to umbilicate, dry and often hygrophanous; *lamellae* distant, broadly adnate to arcuate or decurrent; universal veil absent; *stipe* dry, often with small dots or pruinose punctate; spore print white. *Spores* hyaline, smooth, non-amyloid, subglobose to broadly ellipsoid, small (up to 7 µm long); basidia narrowly clavate, 20–70 × 4.5–8.5 µm, Q: 4.5–10.0, mostly 4-spored; cystidia absent or inconspicuous; hymenophoral trama regular to subregular and composed of short elements up to 170 µm long; pileipellis an hymeniderm; clamp connections present or absent; development monovelangioearpic and stipiticarpic. Solitary to subgregarious, terrestrial in forests or open sites, apparently saprophytic. Mostly in temperate North America, Asia and Europe, but also known from subtropical South America and Asia.

Key to the species of *Camarophylloopsis*

1. Stipe white and finely pruinose; basidia mean length <45 µm.....*C. darwinensis*
1. Stipe pale brown, covered in scattered brown fibrils; basidia mean length >45 µm
.....*C. kearneyi*

TRIBE 2. HYGROPHOREAE P. Henn. in Engler & Prantl, *Nat. Pflanzenfam.* 1: 209 (1898), emend. Kühner in *Bull. Mens. Soc. Linn. Lyon* 48: 617 (1979). *Genus typica:* *Hygrophorus* Fr., *Gen. Hymenomyc.*: 8 (1836).

Hymenophoral trama divergent; forming ectomyorrhizae.

Genus 1. *Hygrophorus* Fr., *Gen. Hymenomyc.* 8 (1836). *Species typica: Hygrophorus eburneus* (Bull.: Fr.) Fr., *Epicr.* 321 (1838).

Basidiome tricholomatoid to omphaloid, fleshy to thin, small to large; *pileus* variously coloured but usually dull colours, not hygrophanous, mostly viscid to glutinous; *lamellae* spaced to distant, broadly adnate to decurrent, thick, waxy; glutinous universal veil often present and sometimes a partial veil; *stipe* often glutinous or viscid, frequently with small dots punctate at the apex; spore print white. *Spores* hyaline, smooth, non-amyloid, *basidia* narrowly clavate, $30\text{--}90 \times 6\text{--}15 \mu\text{m}$, Q: 4.5–9.0; *cystidia* absent or inconspicuous; *hymenophoral trama* divergent from a central line and made of short elements up to $200 \mu\text{m}$ long; *pileipellis* mostly an ixocutis or an ixotrichoderm, rarely a cutis or trichoderm; clamp connections present; development gymnocarpic to pseudoangiocarpic and stipitocarpic. Solitary to gregarious, terrestrial, always near trees or shrubs and apparently ectomycorrhizal principally with Pinaceae, Betulaceae and Fagaceae. Mostly in temperate zones of the Northern Hemisphere, but some taxa in similar climatic regions of Southern Hemisphere.

31. *Hygrophorus involutus* G.Stev., *Kew Bull.* 16: 373 (1962). *Type:* New Zealand. Butterfly, 2.vi.1958, G. Stevenson, (*hb. stevenson. 1347*, holotype K).

Illustrations: Fuhrer & Robinson (1992), p45; Young & Wood (1997), 1020.

Habitat and distribution: Gregarious amongst soil or moss in sub-tropical rainforest, cool temperate rainforest or wet sclerophyll forest. Known from New South Wales and Tasmania.

Material examined: NEW SOUTH WALES. Hazelbrook, $33^{\circ}44'S$ $150^{\circ}27'E$, 12.vi.1998, A.M.Young, *hb. young. 2082* (BRI).

Remarks: *Hygrophorus involutus* was previously known from forests both near and north of Sydney, but has now been collected extensively in Tasmania. The taxon is widespread and it will no doubt prove to be present in Victoria. Very careful examination of fresh material in Tasmania has demonstrated that the hymenophoral trama of this species is weakly divergent so that *H. involutus* should remain within genus *Hygrophorus*. A pure white variant of this species has been found in Tasmania. No other species within this genus is yet known for Australia.

Taxa with Limited Collections

During the 1998 season, several collections were made consisting of one or perhaps two basidiomes. Three of these small collections have been recognised as new species, however the amount of herbarium material collected was considered to be insufficient to form a holotype collection. Nevertheless, well defined characters exist for these collections and two *Hygrocybe* spp. BM1 and Otwl are recorded here in detail; a full description of the third taxon (LC1) is contained in Young (1999).

32. *Hygrocybe* sp. BM1

Pileus 11–14 mm, pale yellow (near 4A4), convex, dry, smooth, margin striate and a little plicate. *Lamellae* decurrent and sometimes forking near the pileus margins, pale yellow (near 4A4), margins concolorous and even. *Stipe* $28\text{--}30 \times 1.5\text{--}2.5$ mm, pale yellow (near 4A4), dry, smooth, cylindrical, pith filled.

Spores $(4\text{--})4.5\text{--}5.5 \times 3.5\text{--}5 \mu\text{m}$, mean $4.7 \times 3.9 \mu\text{m}$, Q: 1.1–1.3(–1.4), mean Q: 1.21,

subglobose to globose or occasionally very broadly ellipsoid, smooth, hyaline. *Basidia* 25–39 × 6–8 μm, mean 32 × 7 μm, Q: 3.5–6.4, mean Q: 4.5, 4-spored, clamped. *Cystidia* absent. *Hymenophoral trama* regular to slightly irregular, composed of chains of ellipsoid to cylindrical, inflated, hyaline, thin walled elements 15–70 × 5–15 μm, clamps present. *Pileipellis* a cutis of repent, hyaline, thin walled, cylindrical or a little inflated hyphae 3–10 μm diameter, clamps present and usually abundant. *Stipitipellis* a cutis of cylindrical, hyaline, thin walled hyphae 1.5–6.0 μm diameter, clamps present. (Fig. 8)

Habitat and distribution: Gregarious on soil amongst litter in wet sclerophyll forest. Known only from New South Wales.

Material examined: NEW SOUTH WALES, Hazelbrook, 33°44'S 150°27'E, 12.vi.1998, A.M.Young (hb. young, 2098) (BRI).

Remarks: This taxon displays characters that suggest the possible artificial nature of two of the presently accepted sub-genera within genus *Hygrocybe*. The Hazelbrook material belongs in sub-genus *Pseudohygrocybe* because it has a distinctly regular hymenophoral trama, yet the subdued colours, decurrent lamellae and very small subglobose to globose spores are all characteristic of sub-genus *Cuphophyllus*. It seems closest to the American species *Hygrocybe aurautia* Murrill which has similar dimensions for spores and basidia but that taxon is bright orange, has adnate lamellae and a pruinose stipe.

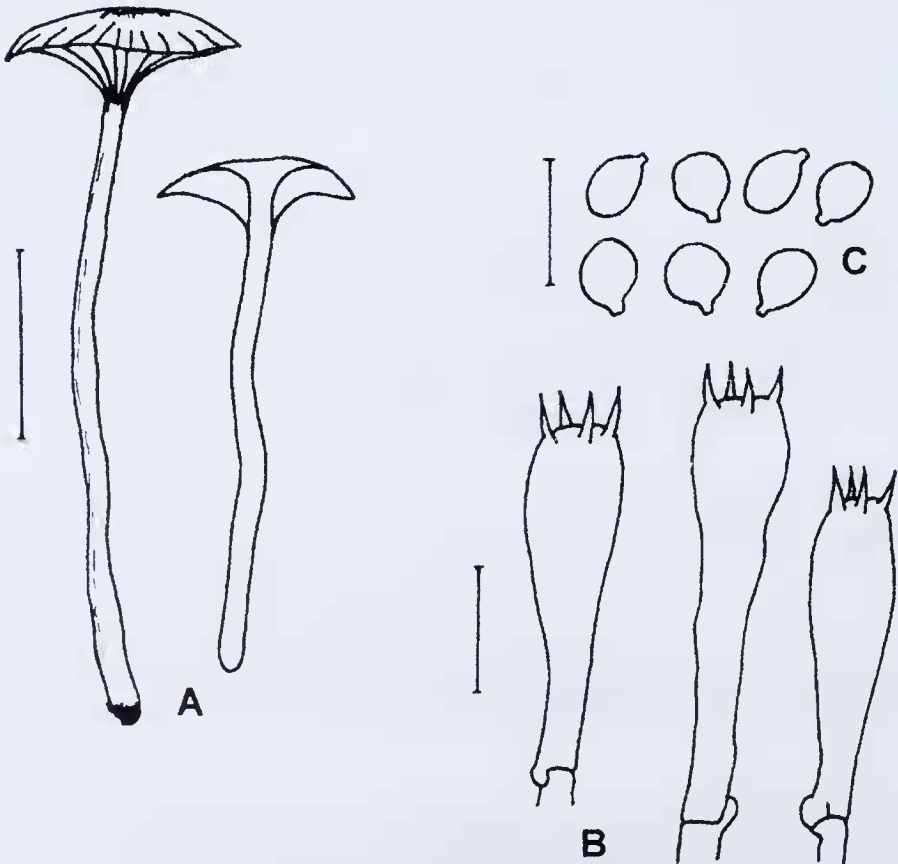


Fig. 8. *Hygrocybe* sp. BM1. A habit; B basidia; C spores. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μm.

33. *Hygrocybe* sp. Otw1

Pileus 27 mm, brilliant scarlet, but yellowing slightly at the margin, convex then a little irregular, viscid, smooth. *Lamellae* yellow with pink flush, adnate, very strongly interveined on the pileus undersurface and on the lamellae faces. *Stipe* circa 30 × 57 mm, orange yellow with pink flush, cylindrical, weakly viscid.

Spores 7.5–9.5 × (4–)4.5–6 μm, mean 8.2 × 5.0 μm, Q: 1.3–2.0, mean Q: 1.64, ellipsoid to obovoid and often constricted, hyaline, smooth. *Basidia* 51–67 × 8–10 μm, mean 56 × 9 μm, Q: 5.7–6.7, mean Q: 6.18, 2- or 4-spored, clamped. *Cheilocystidia* present as hyphal fascicles, cystidia hyphal, cylindrical, sinuous, apices rounded, sometimes branching, 33–56 × 2.0–3.5 μm, clamped at the base and sometimes of medallion form. *Hymenophoral trama* regular to sub-regular, composed of hyphal or long ellipsoid or 'sausage shaped' elements 23–120 × 5–20 μm, hyaline, thin walled, clamps abundant, inflated or not. *Pileipellis* a loose ixocutis of repent and interwoven hyphae 2.0–4.5 μm diameter, thin walled, hyaline, clamped. *Stipitipellis* a cutis or weak ixocutis of repent, clamped, hyaline, thin walled, non-inflated hyphae 1.0–4.5 μm diameter. (Fig. 9)

Habitat and distribution: Sole basidiome found amongst leaf litter. Known only from Victoria.

Material examined: VICTORIA. Otway Ranges, 23.vii.1998, S. Ford (*hb. young 2181*) (BRI).

Remarks: This taxon resembles *Hygrocybe erythrocala* Young in the field but is easily separated by the fasciculate cheilocystidia, the much larger basidia and the wider spores. The presence of the fasciculate cheilocystidia is unusual in this genus.

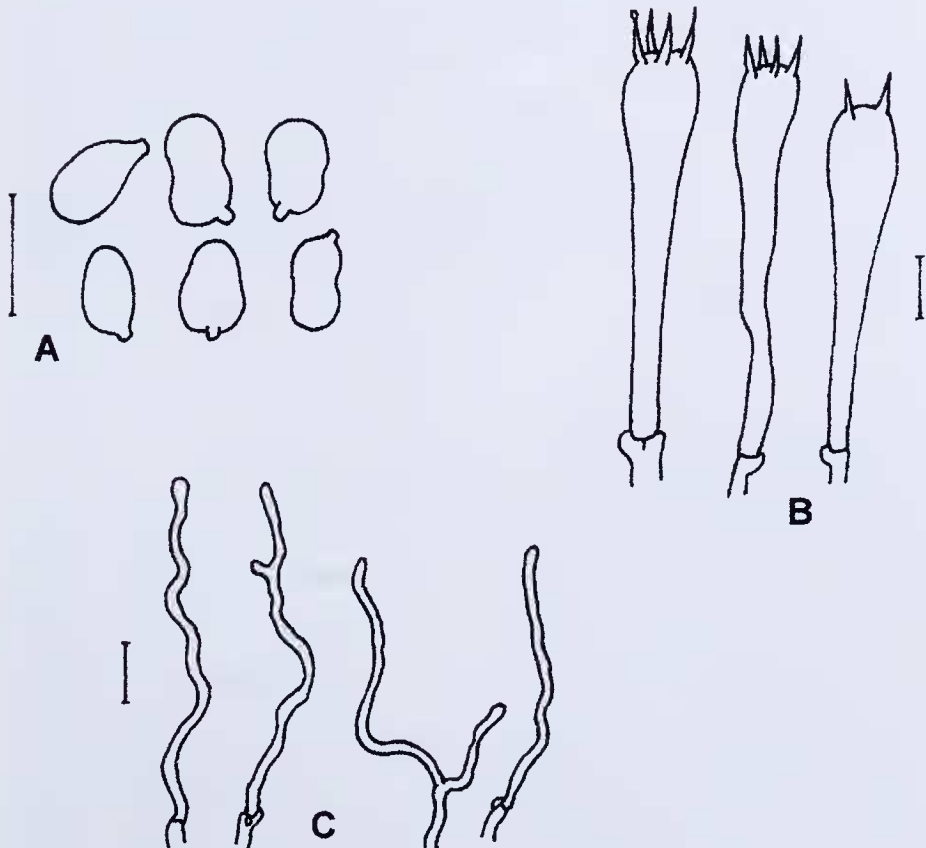


Fig. 9. *Hygrocybe* sp. Otw1. A habit; B basidia; C cheilocystidia. Habit and T/S sketch, bar = 10 mm; microcharacters, bar = 10 μm.

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